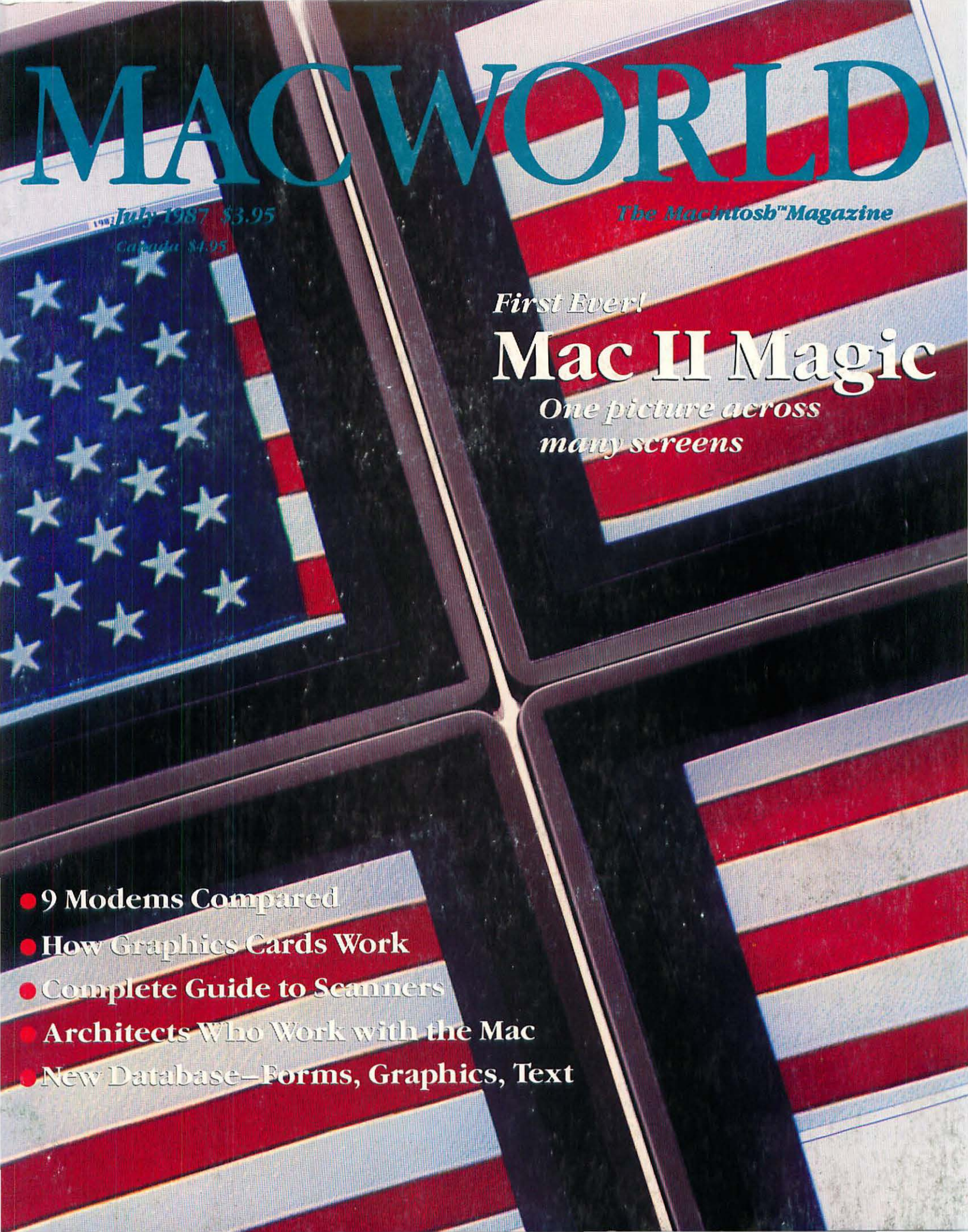
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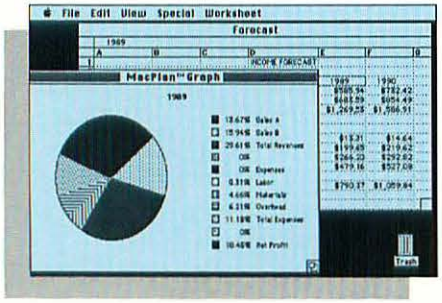
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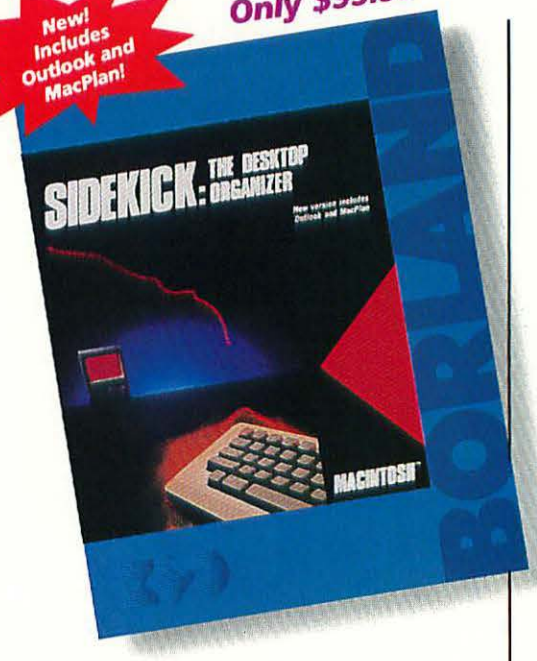
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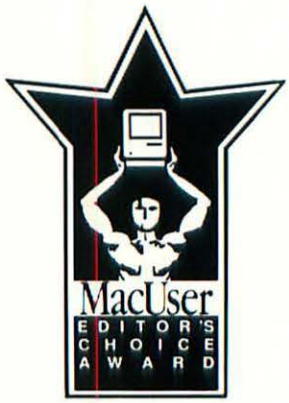
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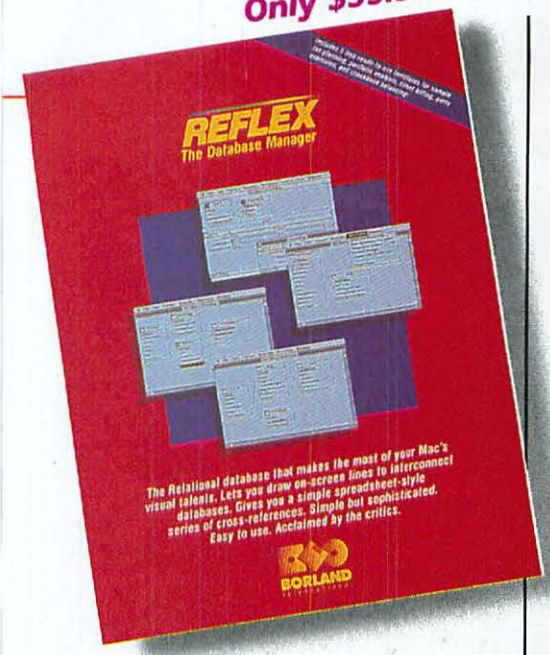
System requirements:
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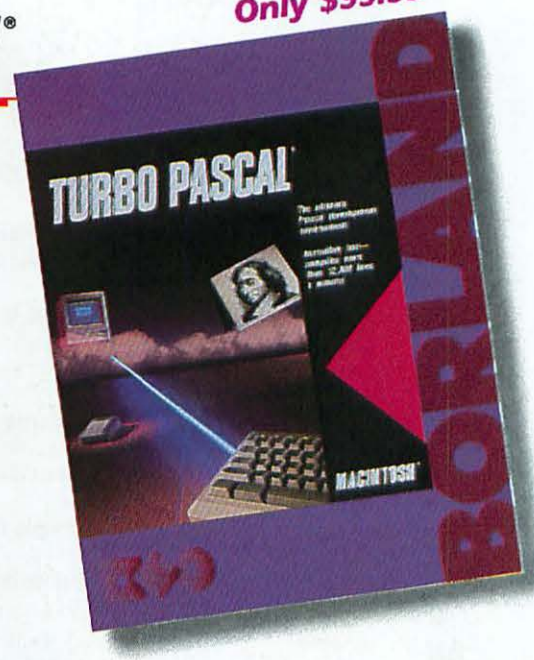
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Robert Forras, MacTimes

Turbo Pascal is already an industry standard in the IBM-compatible world and we're very excited to see Borland International's new commitment to provide this and other modestly-priced, high-quality software for the Macintosh computer."
John Sculley, Apple Computer, Inc.

System requirements:
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July 1987

The Macintosh™ Magazine



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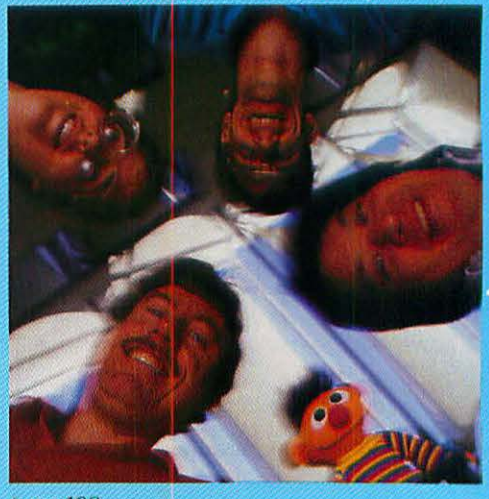
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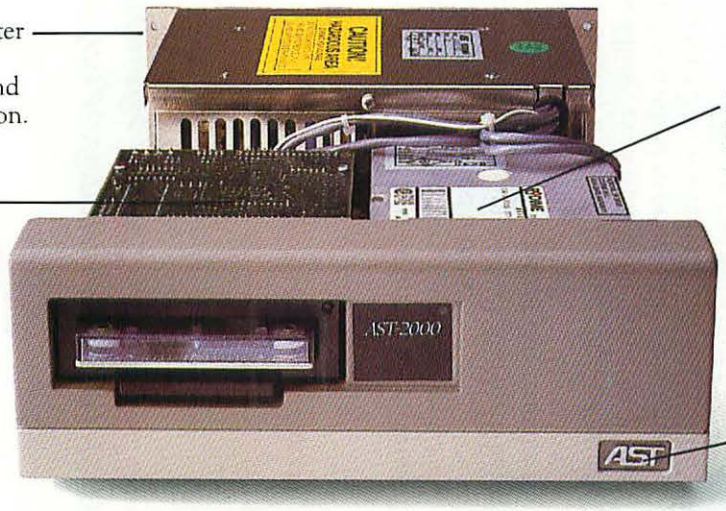
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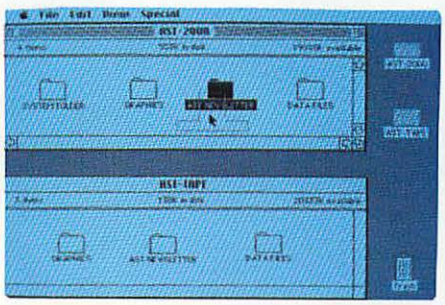
And Then One Day... someone invented SCSI (Small Computer System Interface), a much faster interface than floppy or serial ports. And suddenly, hard disks were more than just lots of storage. They were fast.

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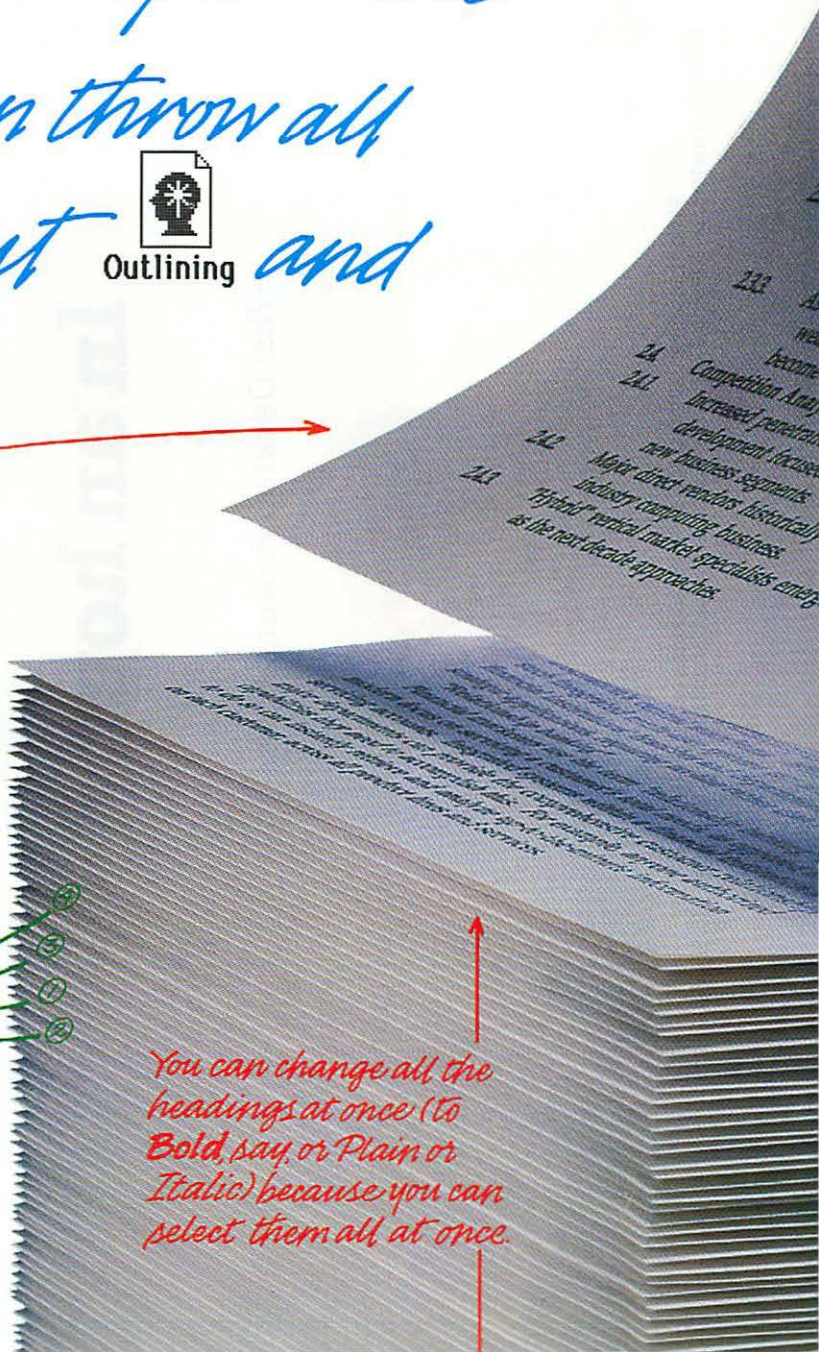
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Mac Bulletin

Apple Sends out a Software Shoot

A year after Guy Kawasaki proposed its formation, and on the heels of his departure to start his own software company, Apple Computer announced plans to create a separate software company to publish programs for the Macintosh and the Apple II. The new venture, initially a subsidiary of Apple, will market existing Apple programs as well as develop new software and publish third-party efforts—but none will have the Apple name on the label. Plans call for the software subsidiary to break off as an independent company, perhaps within its first year.

In his announcement, Apple chairman and CEO John Sculley said the move was intended in part to enable other software developers for Apple machines "to participate in the market on a more equal footing."

In initial reactions, however, developers were not confident that the new structure would resolve the tension caused by Apple's publishing programs that compete with third-party products. One developer said, "It's better to compete against products that don't say Apple on the label, but we're still going to have to look at Apple as a competitor. Apple is not going to start this up and then let it fail; it'll make use of Apple knowledge, money, experience, and most important, its distribution network."

It's not such bad news from the users' standpoint. It probably means that improvements to Apple's staple software will finally be forthcoming, after a long period without upgrades.

Juggler

Last month we reported on Twitcher, the context-switching Finder based on Andy Hertzfeld's *Servant*. The word now is that its code name has changed to Juggler. Though it reportedly contains none of Hertzfeld's code, it is said to remain faithful to the concept—you can have several applications open at once on your desktop. The new Finder will allow some tasks, such as printing, to go on in the background while you work in an application program. Full multitasking—the kind that lets you sort your mammoth database while you write the report to go with it—won't be available with the next Finder. That breakthrough may be announced by the end of the year.

Software Compatibility

If you've tried to run *MacWrite* on a Mac II, you may have experienced some problems. Reportedly, Apple is readying *MacWrite* 4.6 to remedy incompatibility problems and to fix a few ancient bugs.

Expect upgrades to appear for other applications as compatibility problems come to light with the existing 2000-plus applications. To avoid some of the heartburn that accompanied its last major hardware release in January 1986, Apple has initiated a rigorous program to test applications with the new Mac SE and Mac II hardware and the accompanying system software. Apple has alerted developers that they'll have to go back to the drawing board if their products fail, but the incompatibility list has not been made public. Reportedly, fewer than 25 percent of tested applications have problems; most are the type that a programmer could easily fix in a day or two. Until upgrades appear, however, prepare for unpleasant surprises with programs that haven't been tuned to the new microprocessor.

Another IBM Convert

Due to customer demand, Corporate Software, which distributes programs directly to Fortune 1000 companies, has broken with its 3½-year tradition and added 51 Macintosh programs to its list of more than 400 IBM PC software titles. The distributor, based in Canton, Massachusetts, had been special-ordering Mac programs for its corporate customers; now they will order in bulk and offer discounts. "We finally reached the point where the demand reached critical mass," said Mary Harrison, national manager of software sales.

The titles include the full line of Microsoft products (well, almost full; *Flight Simulator* is conspicuously absent), plus Apple's programs and a range of graphics, database management, communications, and word processing software, along with Living Videotext's *More*, Borland's *Sidekick*, and utilities such as John Mitchell's *Fedit Plus* and FWB Software's trio of hard disk utilities.

Kamerman Labs Still Going

Joel Kamerman of Kamerman Labs reports that the Macintosh side of his company's business is healthy even though the firm filed for protection from creditors under Chapter 11 of the bankruptcy code at the beginning of the year. The cause of the business problems, according to Kamerman, was isolated with its IBM PC peripherals. "Ever since we started shipping our Mac Cirrus drives, the company has been profitable," he said. To reassure customers who might be jittery about support for Kamerman's compact Cirrus hard disks or tape drives, Kamerman explained that the Cirrus drives are 80 percent owned by a separate company. "Even if the creditors don't accept our reorganization plan, the Mac products will still be marketed and supported."

Dial-a-User-Group

A few months ago we ran a *Bulletin* item about the meeting of user group leaders held in Dayton last April. The people in Dayton received so many calls—at all hours—from readers who wanted to know how to find a local user group, we figured we'd better publish the referral number again: 800/538-9696 ext. 500. (If you use a non-AT&T long-distance carrier, punch in your carrier code before dialing the phone number.)

(continues)

Game Maker Branches Out

ICOM Simulations, the Wheeling, Illinois-based developer of *TMON* debugger and the Macventure game series (*Déjà Vu, Uninvited, Shadowgate*) published by Mindscape is striking out on its own as a publisher. ICOM will produce one more game for Mindscape to fulfill its contract but then will turn its full attention to marketing its own line of entertainment software, including role-playing games with high-resolution graphics and more games in the Macventure series. The first title to look for is *Helios,* a science fiction adventure due out this fall. *Gossip,* developed by that notorious practitioner John Dvorak, is scheduled for release early next year. Both will be $49.95.

3-D in Color

In the May issue, *Macworld* ran a long article about recent developments in 3-D programs for the Mac. Now it appears that yet another generation of 3-D graphics programs is already on the way, and the common denominator is color.

Challenger Software of Homewood, Illinois, is adding color to its *Mac3D* program this summer, with color shading from a palette of 256 colors selected from the 4096 available on the Mac II.

Chicago-based Enabling Technologies is working on a version of *Pro3D* that will take advantage of color on the Mac II—and the 68881 math coprocessor. The new version improves on its predecessor in other ways, for example, doubling the number and refining control of the light sources and allowing users to save images in PostScript format so that they can be exported into programs like *Cricket Draw.* It's expected out early next year.

Also in 1988, Macromind, the Chicago-based developer of *VideoWorks,* plans to launch a 3-D wire-frame animation program that will accept input in IGES format from existing products, such as *Mac3D* and *Pro3D.*

The greater Chicago area is not the only source of 3-D innovation, however. San Diego's Silicon Beach Software, developer of *SuperPaint,* is preparing a new three-dimensional graphics program due out at the end of the summer that includes color, animation, flexible lighting effects, support of the 68020 microprocessor and the 68881 coprocessor, and the ability to accept text files created by other 3-D applications from micro to mainframe.

Microsoft to Fix Word 3.0

By the time you read this, Microsoft will probably already be mailing version 3.01 of *Microsoft Word* to fix problems users reported in the early days after 3.0's release. The new Mac II-compatible version—mailed free to registered users—includes name stamping and allows unlimited fonts.

Apple Stock Splits

For the first time, Apple Computer announced a stock dividend—12 cents per share—for the first quarter of 1987. In addition, the stock was split two-for-one on May 15. Apple head John Sculley explained, "A stock split will lower the price of our stock, which has recently recorded new highs. These actions should allow a broader group of investors to participate in our future."

The Waiting Game

Still holding out for an upcoming program? Here's a status report on some long-awaited applications.

Quark's new page-layout program *XPress* shipped at the end of March, ahead of the new version of Aldus's *PageMaker,* which started shipping at the end of April. Another desktop publishing offering, Target Software's *Scoop* (a.k.a. *Solo,* a.k.a. *SPUD*) is due out this summer. Meanwhile, looking no worse for wear after being rejected by Letraset, Boston Publishing Systems' *MacPublisher III* (formerly *LetraPage*) began shipping in April. The new version of the page-makeup program includes support for color on the Mac II and gray-scale text.

The world is still waiting for Ashton-Tate's high-end database manager, *dBase Mac,* which now may have to fight for its life if the Acius *4th Dimension* challenger beats it to dealers' shelves.

Remember hearing about *Grey Paint* long ago? The gray-scale graphics editing software for bit-mapped images, developed by Fractal Software, was picked up by Letraset, revised significantly, and is scheduled for release late this summer as *The Realist.*

Doug Clapp's *Word Tools* grammar- and punctuation-repair program has shipped, according to Aegis Development of Santa Monica, California. On the other hand, Ann Arbor Software's *FullWrite Professional* is still under construction, and *Word Perfect* hadn't made it to the beta-test version at press time.

Publishers will probably make an effort to present finished programs for sale at the Macworld Expo in Boston next month, but at this late date it looks as if some may be shown in demonstration-only editions.

And Now, in Four Colors

Adobe Systems' *Illustrator* is a great tool, say professional graphic artists, but it won't be a total solution until there's some way to automate the drudgery of color separations. In response, the Palo Alto company is preparing a desk accessory that breaks down an *Illustrator* image into the cyan, magenta, yellow, and black parts comprising a four-color printed image. Code-named Separator, the program can produce printer-ready negative film on the Linotronic 100 or 300 or positive images on any printer. Adobe has come up with settings that produce good results in print, but designers can also pick their own screen angles and percentages, scale and position artwork, and add registration and crop marks.

SE Inside Drives

According to sources, 85 percent of Macintosh SEs are sold with internal disk drives. But not all of them come from Apple. Rodime, which won't confirm the word on the street that it's Apple's hard disk supplier, has begun to market a 50MB internal drive for the SE ($1595). The Pepper Pike, Ohio, company bases its 3½-inch drive on voice-coil technology, which makes it speedier (average access time: 28 milliseconds) than electromechanical drives that hunt for data track by track. It's also more reliable—the drive heads park automatically when it stops.

CMS Enhancements of Tustin, California, also makes a voice-coil internal drive for the SE, the 38.5MB Pro-40 ($1395), with an average access time of 29 milliseconds. □

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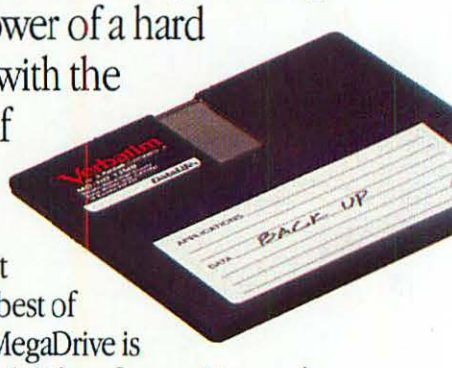
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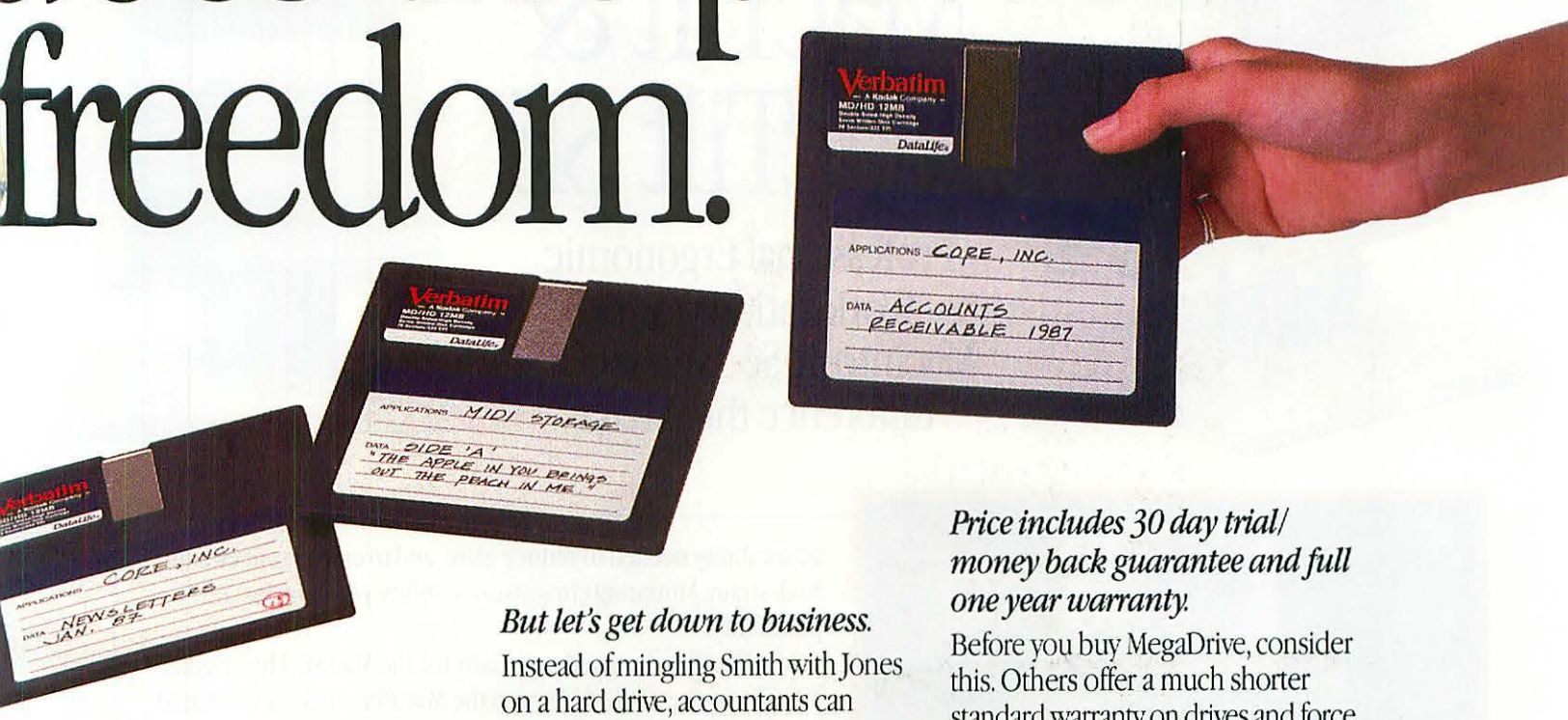


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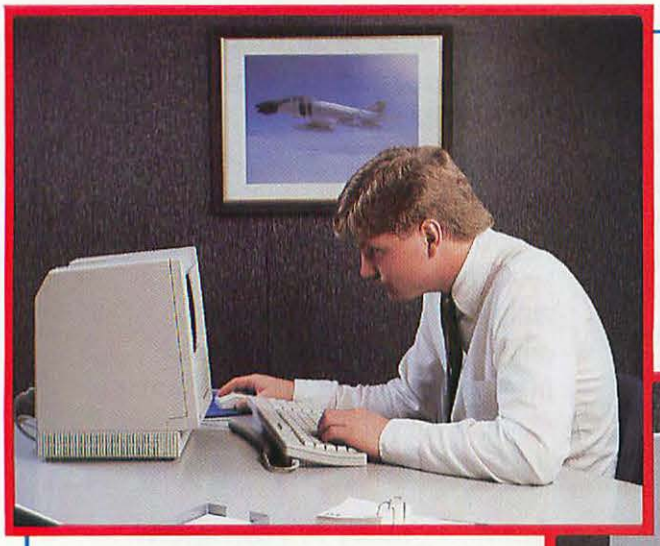
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In business environments where operators spend long hours in front of their computer, the Mac's small screen size and the low physical profile can cause physical discomfort and reduced productivity. A common solution to the low profile problem was to place the computer on top of a hard drive. This is no longer a solution for the Mac SE with its internal hard disk or the Mac Plus when used with a vertical hard drive or a file server.

Phone books, shoe boxes, and other creative ideas have been tried to bring the Mac up to eye level, but with little success.



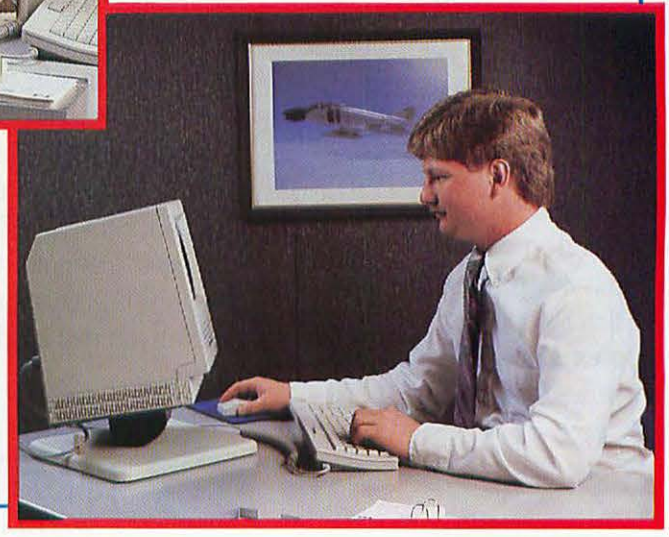
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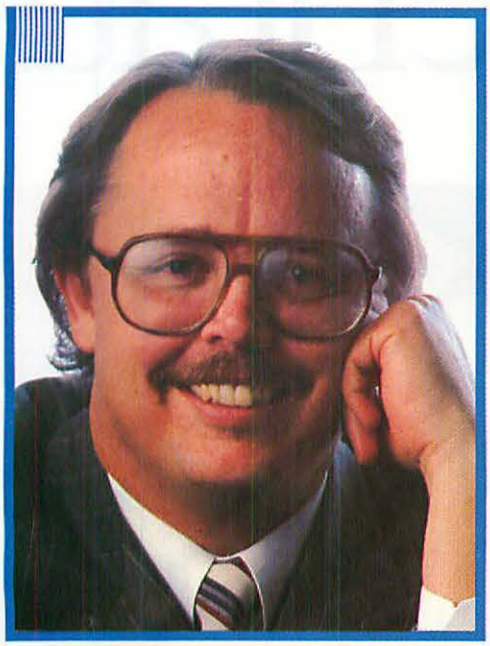
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David Bunnell

Duel of the Desktops



Apple may still be ahead in desktop publishing technology, while IBM's a Johnny-come-laser. But it could be a close race.

The Apple desktop publishing system still has the lead, the edge, the technological chutzpah, and, oh yes, it still outperforms IBM's desktop publishing system by about 200 Mac-years of product development.

Maybe it's because it's IBM's first time around. But whatever the reason, the turnkey PS/2 Model 30 desktop publishing system, which was announced on the same day Big Blue unveiled its next-generation Personal System/2 line of computers, is clearly a case of last year's technology at tomorrow's prices.

In fact, if you squint at it hard enough, you'll see that IBM's desktop offering is virtually equivalent to that of a Mac-based system from nearly two years ago.

I'm talking about a Mac Plus with a hard disk, Aldus's *PageMaker,* and a LaserWriter, compared with IBM's Model 30 system (based on an 8086 microprocessor) with a hard disk, the PC version of *PageMaker, Microsoft Windows,* and a PostScript printer.

Isn't it curious that IBM has announced a genuine "me-too" product after years of dismissing Apple's approach to computer design as being some kind of technological affectation?

The good news for Apple about IBM's entry into the desktop publishing world is that the Mac-based system stands out as a no-contest winner in terms of raw performance.

Here are a few of the most obvious advantages of the Mac system over that of IBM:

Installation of the Mac desktop system is infinitely easier. It takes a full 15 minutes to install the PC *PageMaker,* copying five disks onto 1.5 megabytes of your hard disk. It takes less than a minute to transfer Mac *PageMaker* files to a hard disk or backup floppies.

Windows on the IBM system limits file names to eight characters. And you still need to end files with the proper three-letter extension to open them easily from the MS-DOS Executive. Then you have to grapple with labyrinthine subdirectories. The Mac, on the other hand, has folders that you simply open and close.

Screen quality, font selection, and print quality are all superior on the Mac system. Notably, Aldus's PostScript driver for the PC *PageMaker* lacks the Mac *PageMaker*'s smoothing algorithm that smooths the jagged edges in bit-mapped graphics.

What else? I could go on and on. Perhaps the most glaring weakness of the IBM desktop system is that the controller for the PostScript printer goes into the computer, rather than being contained in the printer.

What does that mean? It means that, if you want to hook up your IBM PS/2 30 to your laser printer, you will need to install the printer controller, which contains a PostScript processor and printer memory, so you can print out the various PostScript fonts that create beautiful text, and so you can use *PageMaker.*

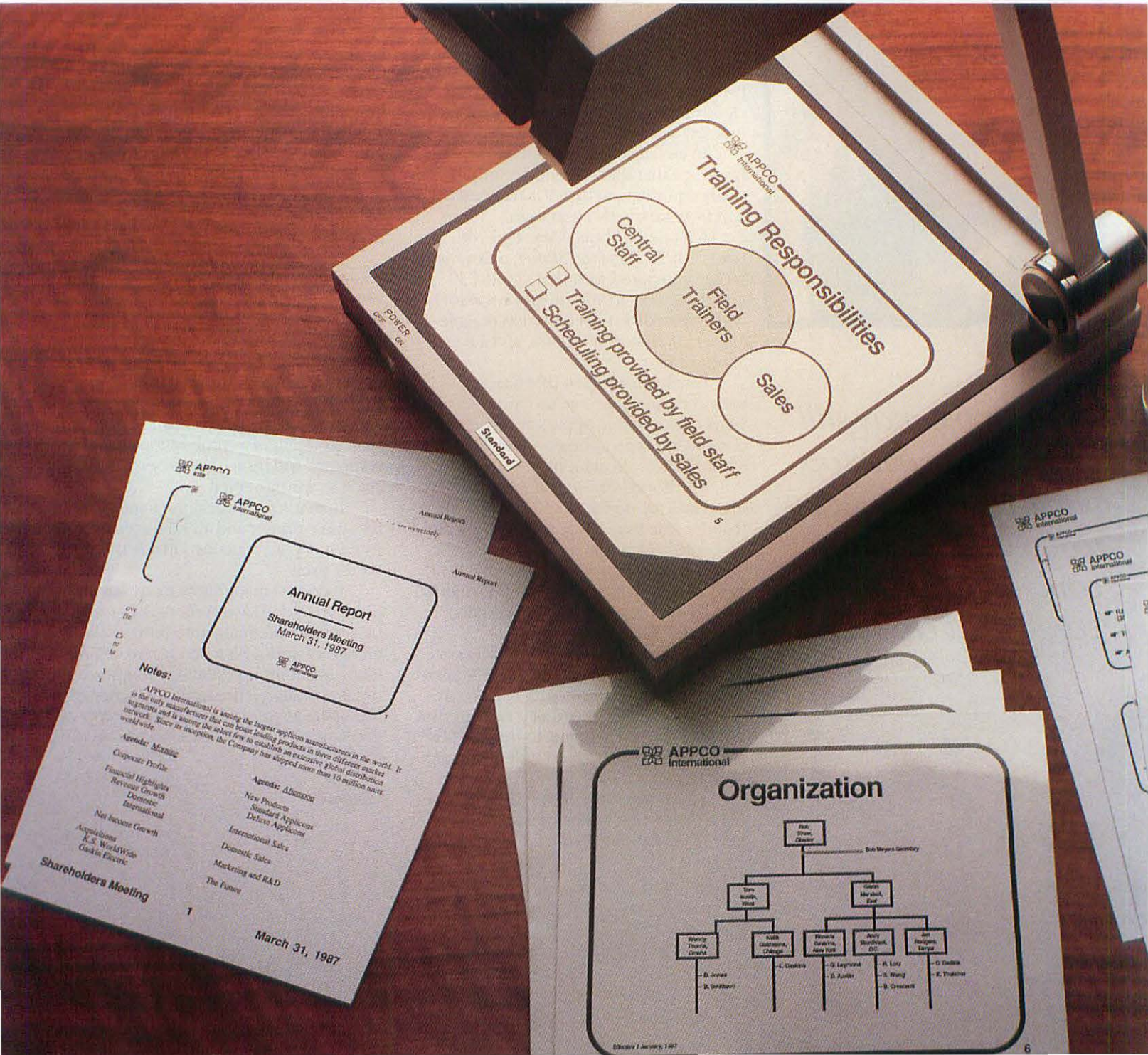
This is fine until you begin adding more computers to your system: the first computer will then have to become dedicated as a print server.

In marked contrast, the intelligence of the Apple printer and all 1.5 megabytes of its memory are contained inside the LaserWriter itself.

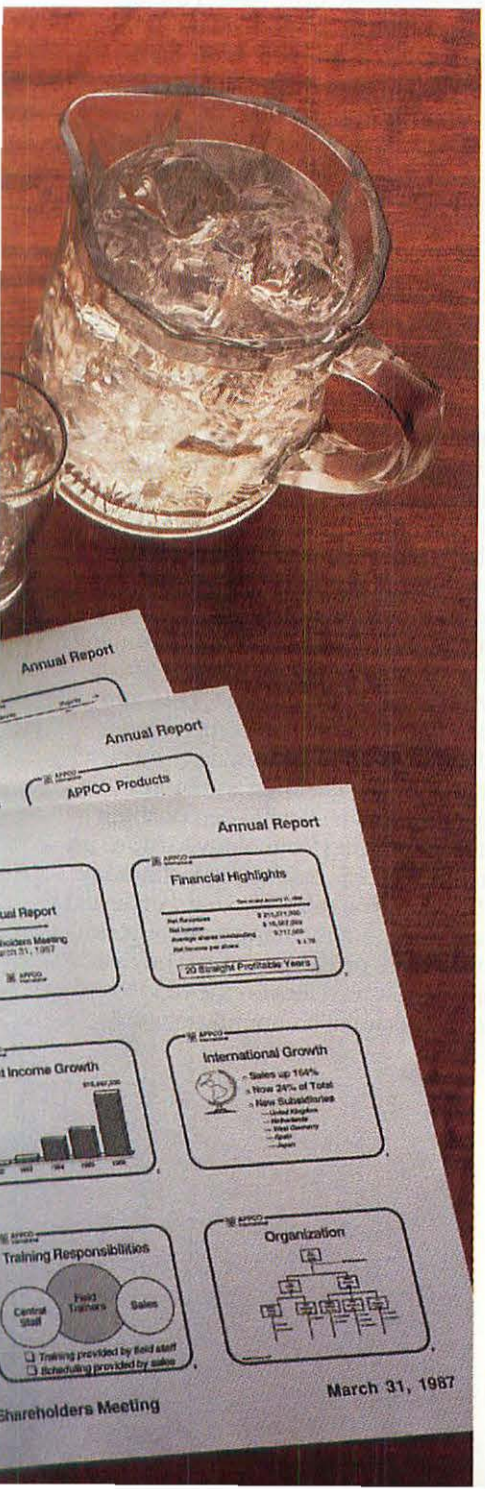
It doesn't matter how many Macs you hook up to one LaserWriter—they can all be configured equally into little work-group networks. So when you're dealing with a work-group situation—like an editorial or design office or a production office—it becomes a much cheaper proposition to have a dozen Macs linked together to one printer.

(continues)

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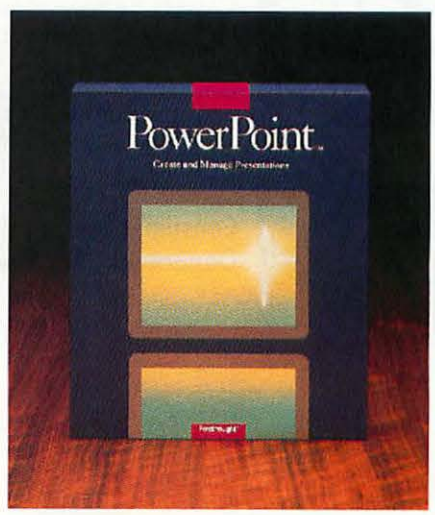
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Circle 289 on reader service card

David Bunnell

Remember the early speculation that IBM would take the desktop market away from Apple? It now appears that IBM is indirectly benefiting Apple, by forcing the desktop publishing market to grow, and by making the desktop concept more widely accepted throughout the corporate world.

I don't think there's much doubt that IBM brought out its own desktop package to protect its existing customer base—those Fortune 1000-type companies that have nothing but IBM computers, from mainframes to minis to terminals and PCs. Big Blue should do very well in selling to this segment of the market.

But since Apple has the definite technological advantage over IBM in the desktop field, I believe that some of the more adventuresome of even the IBM "lifers" might switch over to the Macintosh.

So long as Apple continues to maintain its edge in "usable-real-world-what-you-can-do-with-it-right-now" technology, it'll be able to penetrate the IBM market. And as it penetrates enough of that market, it will be perceived as the number one alternative to Big Blue.

For that matter, it's not inconceivable that Apple will remain number one in desktop publishing. Apple could easily end up having about 60 percent of the desktop publishing market in contrast to IBM's 20 percent, with the rest going to the clones.

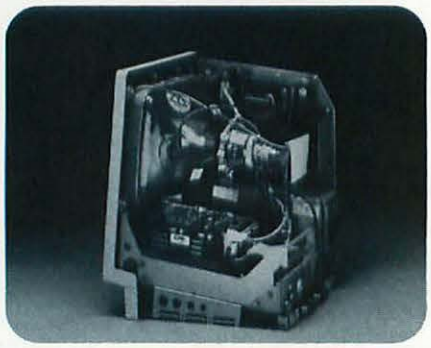
Be assured that Apple will not be content to rest on its desktop laurels. It's no secret that in the near future there will be a new multitasking operating system for the entire Macintosh line that will give Apple an even greater lead over IBM's expanding desktop universe.

And that's all for the best. This competition between the two companies is wonderful. It's going to stimulate the development of better, cheaper, and more powerful products. It will keep pushing desktop publishing technology forward until it truly becomes publishing technology.

So when you think about it, Apple and IBM are really not the dangerous adversaries that they're made out to be. They are actually fellow travelers on the road to enlightened personal computing. □

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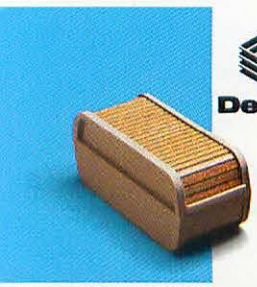
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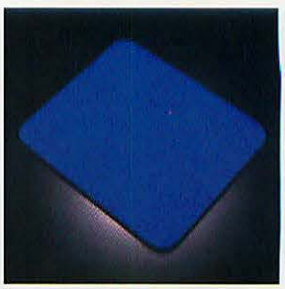
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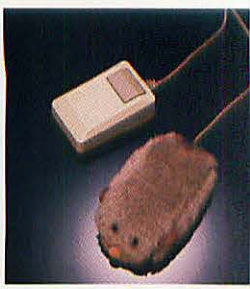
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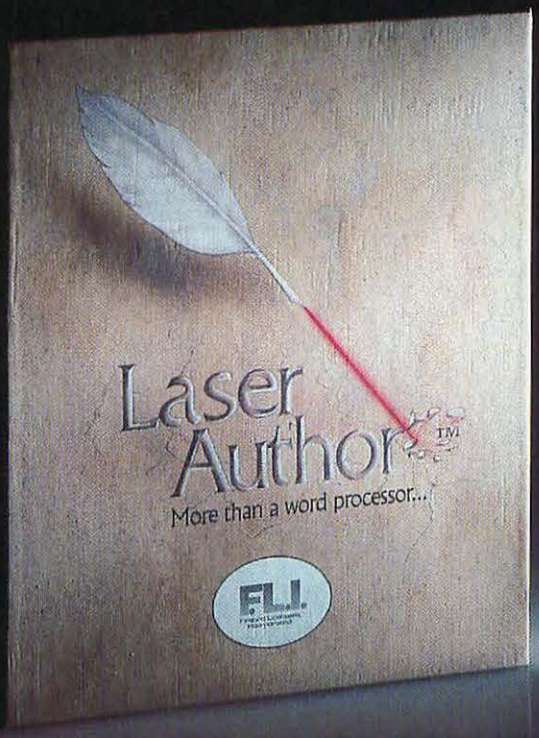
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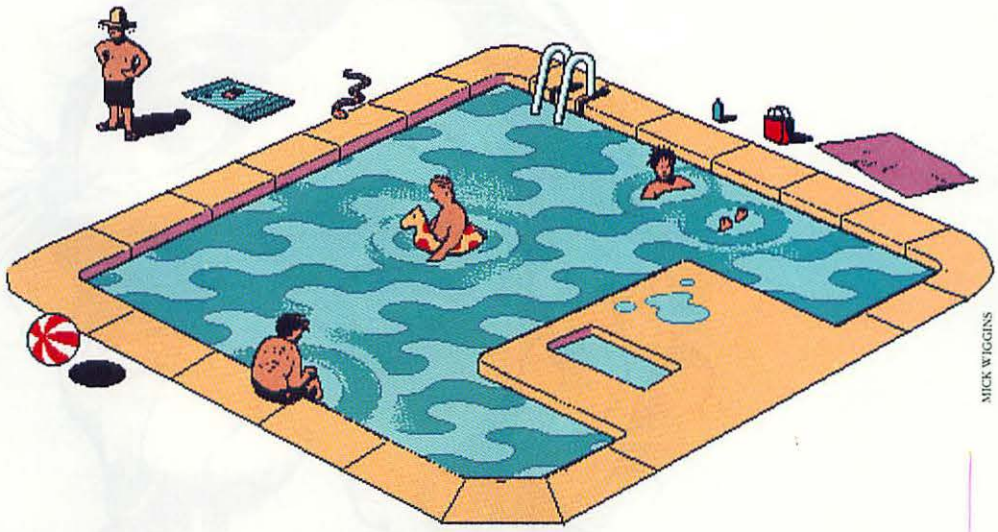
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Letters

A forum for Macworld readers



MICK WIGGINS

Shareware Defined

Let me try to clear up some confusion about shareware. Something that is in the public domain may be used, copied, and so on, by anyone, anytime, without restriction. Some of the software posted on electronic bulletin boards (including some of my stuff) is truly public domain. Most of it isn't; most of it is copyrighted. Shareware (sometimes called *honorware*) is what most of us call copyrighted programs that an author puts up on bulletin boards for others to download (usually with the stipulation that commercial distribution is forbidden), asking for payment from people who keep using the program. In the case of *Other* and *DAKey,* for example, I charge a $10 registration fee. Someone who obtains the initial trial copy on a $5 disk from a user group–or from me by sending a self-addressed mailer and a $5 handling fee–still needs to pay the $10 to become a registered owner.

Loftus Becker
via CompuServe

Oasis Revisited

You recently mentioned my Finder replacement, *Oasis,* calling it public domain software, though it's not. Currently there are two versions of *Oasis* available–version 1.3, which is shareware ($15) available from most user groups and on-line information services, and version 1.4, which is available from me to registered owners only (send the shareware fee along with a disk and a self-addressed, stamped mailer). Version 1.3 allows you to configure up to 100 buttons on the screen to allow launching that many applications or documents with a single click of the mouse. Version 1.4 supports multiple volumes and adds a built-in disk and folder copier, along with other enhancements.

Jan Eugenides
P.O Box 151
Maynard, MA 01754

More CAD Comparison

As a professional CAD user of more than a dozen CAD packages on both the IBM and Macintosh computers, I question the conclusions of "The CAD Comparison" in the November 1986 issue of *Macworld.* Key comparison issues were not mentioned in the article.

Specifically, *MacDraft* is a very powerful object-oriented graphics program, but it doesn't support the object snap feature typical of most CAD applications, and this severely limits its ability to create accurate layouts. *MacDraft*'s zoom function does not satisfy the needs of power CAD users because it is not truly variable. And while *EZ-Draft* does have the best implementation of layers, the current version works slowly and suffers from an interface that is not Mac-like.

Errors in the review slight *MGMStation.* It does have scroll and pan functions, an IGES translator, and it is very easy to learn and use.

Professional design is my career. I use both IBM PCs and Macs and want the best tools at competitive prices. We shopped around and found *MGMStation* to be the most complete CAD package available at any price for the Mac. I calculate that I can

(continues)

Corrections

After "Insights on Red Ryder" (April 1987) went to press, program author Scott Watson decided not to release the version he had discussed with us. Many of the article's tips are therefore moot, except to the few who downloaded the same version during the brief period Watson had it available on line. In fact, as the July issue went to press, version 10.0 still had not been released. The information phone number for Red Ryder *is 314/523-2190.*

In "Macintosh II: Opening to the Future" in the April issue, the colors were swapped in the legend of the Mac II processing diagram (page 137): the red section shows NuBus, the blue section represents 32-bit address and data. In the same issue, the Mac SE memory configuration diagram (page 142) contained some errors. A corrected version of the diagram appears in this month's Letters.

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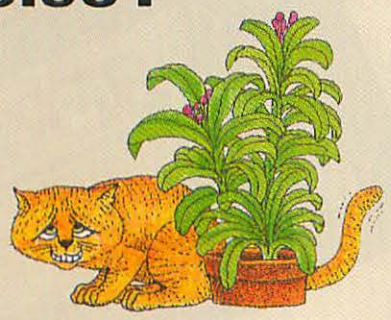


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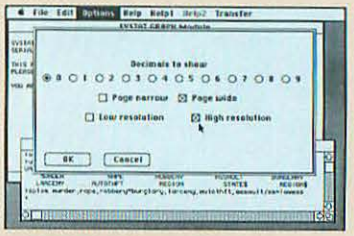
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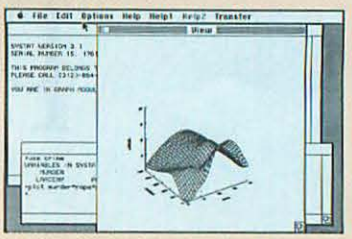
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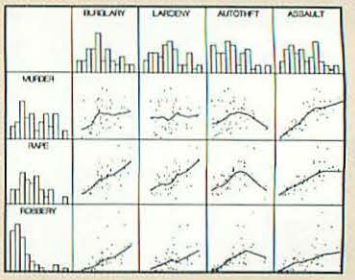
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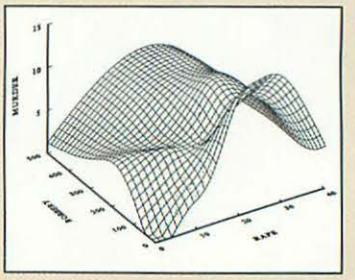
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Did you know that some "expandable" memory upgrades require you to insert chips that don't even exist? Or that others make you replace the entire upgrade with a new one?

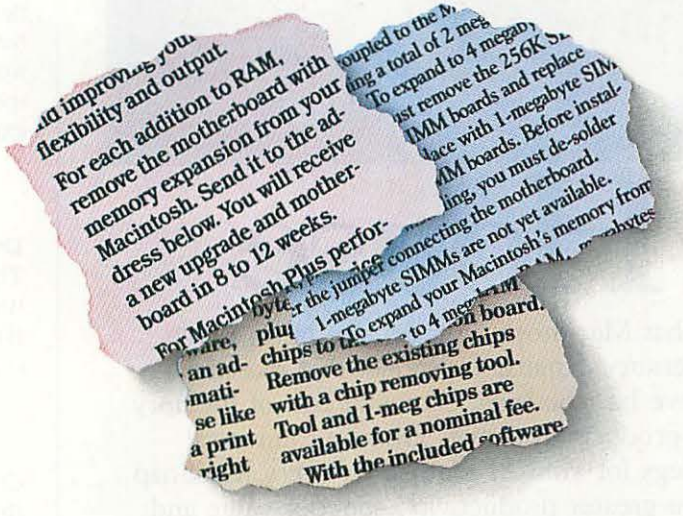
Maybe you're familiar with upgrades that give you the memory you need, but are so large they prevent you from adding an internal or external hard disk and other Mac accessories.

These are not acceptable memory upgrade situations to us at Mac Doctor, and they shouldn't be to you either. Because now Brainstorm can deliver memory, guaranteed expandability and a small enough size to accommodate any accessory, all at a price within every Mac owner's reach.

EASY ENOUGH TO EXPAND YOURSELF

Brainstorm is so easy to expand that you can do it by yourself. You just exchange the plug-in memory module. No rebuilding of boards, no messing with the motherboard, and no down time waiting for your memory upgrade to be expanded.

Brainstorm gives you complete flexibility in upgrading from 1 to 2 or all 4 megabytes by simply exchanging the memory module. And even at 4 megabytes, Brainstorm doesn't obstruct the 68000 CPU–it will accommodate your internal hard disk as well as external drives that use clip-on SCSI ports. Brainstorm expands your memory, without penalizing you by subtracting space needed for accessories. Other upgrades simply can't say the same.



INCLUDES PERFORMANCE SOFTWARE

Most memory upgrade utility software will increase your Mac's performance to some extent. But Brainstorm not only comes with a full set of Performance Software™ it also includes a complete *User's Guide To Increased Mac Performance*. Written in plain English, this user's guide tells you how to take advantage of all the extra power that Brainstorm puts in your hands.

Brainstorm's Performance Software includes RAM disk, which runs applications 10 times faster. And Switcher, which runs many programs at once and switches between them instantly. And Brainstorm's RAM Cache loads a whole program into memory at once. No more waiting to do your job while the disk drive spins endlessly every time you touch the mouse.

NO FAN NEEDED

Even at 4 megabytes of RAM, Brainstorm runs cool. Its PowerSaver and CMOS memory chips reduce memory energy consumption by over 50%, generating much less heat and eliminating the need for a fan. For example, a 2 meg Brainstorm runs as cool as a 128K Macintosh!

100% COMPATIBILITY WITHOUT EXCEPTION

Use whatever Apple software and accessories you want with Brainstorm, because it's fully compatible with both old and new Apple ROMs, the 400K and 800K disk drives, and all Mac and Mac Plus software.

This is no idle promise with a disclaimer; it's another Mac Doctor guarantee. Because in the rare event some software can't adjust to the higher RAM, you can switch back to 512K at the click of a mouse with Brainstorm's exclusive ROM Enhancer.™

GUARANTEES THE OTHERS CAN'T TOUCH

Mac Doctor guarantees that Brainstorm will function without defect, or we will repair or replace your Brainstorm free for one year. The Brainstorm memory chips are guaranteed for a lifetime–free replacement for as long as you own your Macintosh. And don't forget the full guarantees of compatibility and, of course, expandability.

GET FREE TIPS TO BOOST MAC PRODUCTIVITY NOW

Receive a free six-month subscription to *Brainstorming* just by calling (415) 964-2131. This bimonthly newsletter tells you how more memory speeds your work and is loaded with tips to help you get more from your Mac.

Get the power of a Brainstorm memory upgrade today by calling (415) 964-2131.

So when the competition tells you about their "expandable" memory upgrade, you won't have to see the fine print. Mac Doctor Electronics, 1145 Terra Bella Ave., Mountain View, CA 94043



Circle 395 on reader service card

draft designs 100 to 150 percent faster with *MGMStation* than with *AutoCad*. Sure, there are improvements to be made (such as better layers and a zoom-previous command), but the company is very good at providing continuing updates.

Chipp Walters
IDSA
Houston, Texas

A Second Opinion

Ken D. Schuempe's review of *McCAD PCB* in the February issue claims the program doesn't offer the same level of sophistication as Wintek's package. If by sophistication he means *McCAD PCB* doesn't have an autorouter, then I agree. But if he means the ability to choose from a wide selection of options such as pad id/od, trace thickness, grids, and so on, then *McCAD PCB* is by far the more sophisticated and flexible product at less than half the price. I have been using both programs in my work since they were introduced, so I speak with a fair amount of hands-on experience.

Robert Troeller
New York, New York

Dvorak Connections

The October 1986 article "Keys to the Future" mentions the Dvorak International Foundation. How do we reach this organization?

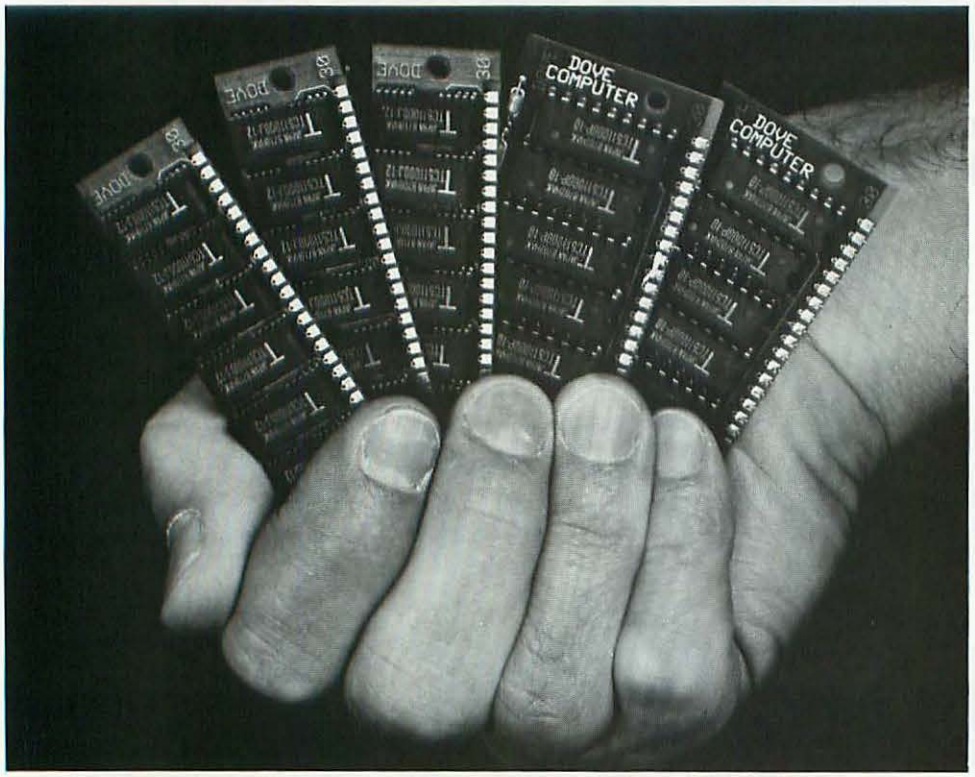
Ralph F. Thompson
Cincinnati, Ohio

Contact the foundation at P.O. Box 128, Brandon, VT 05733. We also left out reference to a useful quarterly periodical, Dvorak Developments, *($12/year) and Randy Cassingham's 96-page book,* The Dvorak Keyboard. *The book, usually $12.95 postpaid, will be $10 postpaid through October. Both are available from Freelance Communications, P.O. Box 1895, Upland, CA 91785.—Ed.*

Lighting in the Round

Here's a tip to add to the collection from "Hands-On Digitizing" in the March 1987 *Macworld*. I have found in photographic copy and close-up work that setting up two lights at a 45-degree angle may make it hard to balance quantities of light, sometimes resulting in unwanted shadows. I avoid shadows by using a circular fluores-

(continues)



Full House

It's a safe bet that no matter what Macintosh™ model you have, Dove Computer has a MacSnap™ memory expansion product that matches your needs. That's because Dove has the most extensive line of memory and productivity enhancement products available. From our universal SCSI port for your 512 to 8 Megs for your Macintosh II, every MacSnap model is engineered to give you greater productivity, superior value and more. We've even gone a step further to insure that you have "upward compatibility." If you enhance your Macintosh Plus to 2.5 or 4 Megs today using our 1 Megabit CMOS SIMM products, you can take the memory with you in the future when you move up to the SE or the Macintosh II. Plus you get the support, quality and technology leadership that we have become known for. And it's all available TODAY! So don't gamble. Deal yourself the unbeatable combination; you, your Macintosh, greater productivity and complete compatibility from Dove!
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Our big drives use voice coil technology, making them lightning fast. They come with THINK Technologies LaserSpeed,™ a $99 value.

All our big drives come standard with QuickPrint™ (our imagewriter print spooler), a $79 value. Plus SafetyNet™ Manager and SafetyNet Personal backup software, a $150 value.

What's more, our drives are inexpensively upgradeable. Only with us can you double or triple storage capacity within the original cabinet. Plus we've worked side by side with Apple well prior to the introduction of the Mac SE and Mac II to assure the finest performance and compatibility available. And all our drives are covered by a full-year warranty.

You've just read through quite a few reasons to buy your drive from us.

So give us a call today.



From left to right, the Mirror family: Magnum 800, Magnum Tape 20, Magnum Tape 40, MagNet 20X (not pictured), MagNet 30X, MagNet 40X, New MagNet 85/40, MagNet 85X, MagNet 172X, MagNet 340X, MagNet 40/40.

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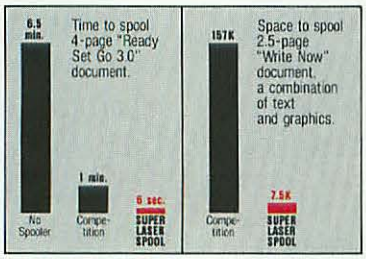
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BLINDINGLY FAST. By sending your print files to the background and returning control of your Mac to you, SuperLaserSpool lets you work and print at the same time. And it does this *5 to 40 times faster* than its nearest competitor.

SuperLaserSpool gets you back to work fast. You never wait for the printer, no matter how many documents you have queued up or even if the network is busy. SuperLaserSpool automatically manages the entire printing process while you work.



Look how much faster SuperLaserSpool will give your Mac back compared to its competition.

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WORKS WITH ANY APPLE® PRINTER. SuperLaserSpool can print to the LaserWriter and ImageWriter™ (either direct-connect or AppleTalk™-connected).

INCREDIBLY COMPACT. Other spoolers require so much storage space that a hard disk is essential. Not so with SuperLaserSpool. You can use it with floppy-disk systems because its files are so compact.

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EASY TO USE. With SuperLaserSpool, you can view all the jobs in the print queue, change their priorities, delete jobs, receive on-screen help, and check on network activity. Your spool files are always safe, even if the system crashes.

SuperLaserSpool works with almost all Macintosh applications. You can even leave and enter different programs without disrupting the printing of documents.

And it's completely invisible: You can launch it and forget it's even there.

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cent tube and modifying the mounting bracket slightly to allow the camera lens to fit through the center of the tube.

Jim Zabielski
Lakewood, Colorado

Turning Back the Clock

In the April 1987 issue, your response to Don Lund's letter states that *dBase Mac* is limited to the Apple date scheme, which cannot handle dates earlier than January 1, 1904. In fact, our program is not constrained to Apple's poor choice of internal date representations. Rather, we use a long integer (32 bits) to represent the number of days since a much earlier date: January 1, 4713 B.C. The program can even show the day of the week for that date range, while taking into account the calendar changes that have taken place over the centuries.

Michael D. Rossetti
Ashton-Tate
Glendale, California

At press time Ashton-Tate had still not shipped its long-awaited database manager, but when it does, the software's date handling ought to come in handy. Odesta's Helix *also handles dates earlier than 1904.—Ed.*

Turning the Tables

The comparison table that accompanied the December 1986 article "Writing Your Own Ticket" sold *Microsoft Word* version 1.05 a bit short. It does have soft hyphens (⌘-hyphen), on-line help (select About MS Word on the Apple menu), and global change of fonts and type styles.

The January chart comparing desktop publishing programs ought to say that *ReadySetGo* version 3.0 has a maximum font size of 250 points and that the program has soft hyphens.

Robert Art Morgan
Julian, California

You're right about the soft hyphens in Word *and* RSG *3.0 and* Word's *on-line help. When we say global font and style change, however, we don't mean that you can select an entire document and change it all to the same new font or style. Rather, we mean the capability found in some new programs to go through a document and pick out, say, all text formatted in New York bold italic and change it to another font or style all at once.—Ed.*

(continues)



50% MORE STORAGE. IMAGINE WHAT IT'LL DO FOR THE MAC SE.



Get 30 or 45 meg storage with our internal drive upgrade.

Until now, there were only 2 ways to buy the new Mac SE.™ You could get it equipped with two 800K floppies. Or, with a floppy and a 20 meg internal drive. Those were your choices.

We thought that was a little limiting. What about all the storage hungry people out there? People who want to outrun, outsmart and outdo the competition? Well, here's your answer.

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THE 300 SE AND 450 SE.

Before you buy your Mac SE, have your dealer replace one of its standard 800K drives with our 30 meg drive (300 SE). That gives you 50% more storage. 50% more, that's nothing to sneer at. And all it will cost you is $100 over the regular 20 meg SE price.* Or if you want more storage, have our 45 meg drive (450 SE) installed.

Our drives come with shock absorbing mounts to manage the hustle and bustle of everyday use. And if you need to chain hard drives or tape drives, you can easily turn termination on or off. Plus, changing SCSI address is as easy as a push of a button. (Apple doesn't offer any of these features.)

So if you're after the most storage a little money can buy, talk to a Mirror Tech dealer. And together, we'll make your Mac SE the best it can be.

FREE SOFTWARE. ANOTHER GREAT REASON TO UPGRADE.

If you choose to upgrade your Mac SE with our 30 or 45 meg drive, we'll give you THINK Technologies LaserSpeed™ (a $99 value) free.

Plus we'll throw in QuickPrint™ (a $79 value) and SafetyNet Personal backup software (a $150 value) too.

Of course, both of these drives are covered by our full-year warranty. So give your Apple dealer a call right away. Because when a deal's this good, the phone lines get busy real fast.

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Just look at these prices. They're about 40% lower than you'd expect because we sell directly to you, eliminating the dealer's mark up. And dedicated as we are to low prices, we're even more dedicated to quality. In fact, we're so convinced of our quality that if after 30 days you don't absolutely love our product, return it for a complete refund.

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So get your drive from Warp Nine. And you'll get more than you bargained for.



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A 21, 31, or 41MB external SCSI hard drive. Fast, dependable, rock-solid performers. HFS and MFS compatible. Daisy chain up to seven SCSI devises. Photon 20, 30 and 40 prices: For MacPlus—**$569.00, $789.00, $949.00.** *For 512k with our PlusPort—**$699.00, $939.00,** and **$1099.00.**

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Simply clip on with no modifications necesssary. Fully compatible with all your software.

WarpRam—Upgrade for Mac 512k to 1024k RAM. For 512E with 128k ROM-**$179.00.** For 512 with 64k ROM-**$189.00.**

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MonsterRam 2.5—2.5 Mb upgrade for MacPlus. Uses 1 **megabit chips** and **SIMM technology.** Compatible with internal hard drives and large screens. Low power consumption. **$595.00**

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Whisper-quiet 800K double sided disk drive. Compatible with 128K, 512K, MacPlus and SE. No hardware or software modifications necessary. Distinguishes 400K and 800K diskettes and will read and write to them accordingly. Features push button and automatic electronic ejection. Cable included. All models. **$189.00**

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The Transporter is a stand alone 20Mb tape drive. The 2001 a single unit that combines a 20Mb hard drive/20Mb tape drive. The hard drive in the 2001 delivers all the speed, dependability, and flexibility of our Photon 20. Both tape drives will backup and restore data and applications safely onto cassette tapes. Tape drives feature volume, file-by-file and incremental backup. Can backup daily files in as little as three minutes. Transporter and 2001 prices: For MacPlus: **$799.00, $949.00** For 512k*: **$1399.00. and $1549.00.**

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*The Warp Nine PlusPort adapter puts a MacPlus type SCSI port on the back of your Mac 512K. It is included with each 512K price. This adapter allows you to connect our SCSI hard drive and tape back up to your 512K and transfer data at the high speed that the MacPlus does. No modifications. No soldering. Just Clip on. Very simple to install.

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If you're planning to get a Mac SE, buy it with dual 800k floppies. Then order one of our 20, 30 or 45Mb internal hard drives and install it in place of one of the 800k drives. This gives you a floppy and a hard drive for hundreds less than you'd pay with Apple. And it's very simple to do.

Just remove the 4 screws that hold the 800k in place and replace it with our drive using the same screw holes. In 30 minutes you're done. Plus we'll send you an easy-to-follow manual and a toll-free technical support number should you have any questions.

What's more, our hard drives come with three features that Apple doesn't offer. Ours have 4 shock mounts to absorb the bumps and grinds of everyday usage. You can easily turn termination on or off if you need to chain hard drives or tape drives. And you can quickly change SCSI address to add another hard drive or tape backup.

P20i (20Mb)–**$499.00****

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***This price includes a rebate of $100 if you return the 800k floppy drive to us in our pre-supplied box. P20i, P30i, and P45i without rebate $599.00, $749.00 and $999.00 respectively.*

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MACWORLD May 1987

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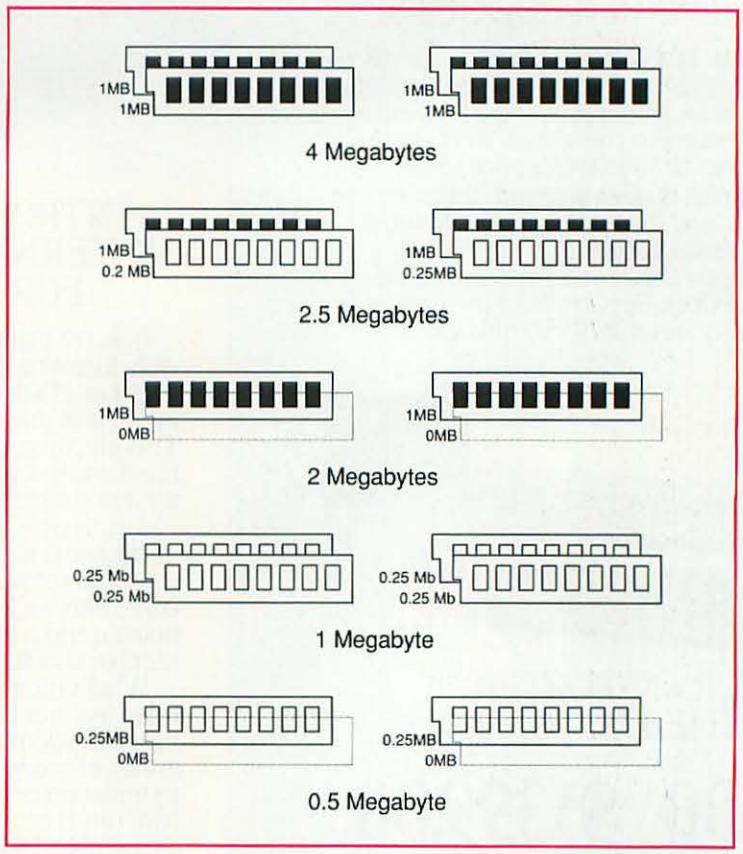
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Letters



Expanding Mac SE Memory

This is a corrected version of the memory configuration diagram that appeared on page 142 of the April Macworld. *It shows the options for expanding memory—up to 4MB—on the two banks of SIMMs in the SE. No matter how much you add, each bank must contain equal amounts of memory.*

Mugging

Steven Levy's column about user groups in the March 1987 issue reported that some people thought that once the Mac's bugs were worked out, the machine's ease of use would obviate the need for user groups.

That's unlikely because the Mac's growing sophistication and versatility will continue to make demands on both novice and veteran users. Some 300 people attended the February meeting of the New York MacUsers Group, and half of them raised their hands to show they were there for the first time.

Don Swaim
NYMUG Board
New York, New York

Traditional Values

The January issue's news about desktop publishing advances was exciting. However, as a bookstore owner, an occasional book reviewer, and a freelance editor, I'm concerned lest all this capability convince otherwise astute writer/publishers that they are also book designers and editors. All the talents necessary to produce attractive, professional-looking, salable books rarely come in one human package.

Books don't leap off bookstore shelves. Poorly packaged material, no matter how important, is not likely to win expensive shelf space. The competition from well-done books is too intense. And book reviewers are usually too busy to waste their time on poorly produced material. My advice for self-publishers: get help; unless you're a triple talent, you'll need it.

Jim Estes
Deadwood, Oregon

For Want of a Nail

My kingdom for a powerful customizable database management program that works.

Ted F. Yengling
Newburgh, Indiana

Aside from Blyth's Omnis 3 *and Odesta's* Double Helix, *at least one new entry is on the way:* 4th Dimension, *from Acius. Read more about the program in "Into the 4th Dimension" in this issue.—Ed.*

Letters should be mailed to Letters, Macworld, *501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe 70370,702 or The Source BCW440. Include a return address. We reserve the right to edit letters. All published letters become the property of* Macworld. □

Built For Speed



Introducing TurboMax™ from MacMemory.

The company that's been making affordable high-performance Macintosh™ products almost as long as Apple® has been making Macintoshes.

TurboMax is a high-performance "clip-on" accelerator board that comes with all the power features a power user needs. But with a price much lower than competitive products.

We started with sheer speed. In fact, the CPU in the TurboMax is nearly three times faster than the one in the Macintosh Plus. So database, graphics, and desktop-publishing programs all run faster than before. And TurboMax is 100% compatible with all Macintosh software.

We also added memory — 1.5Mb that brings your Macintosh Plus or Macintosh 512KE up to 2Mb, expandable to 4Mb. And our "super-speed" SCSI port that runs twice as fast as the standard Macintosh Plus SCSI, and allows internal or external SCSI disks to plug right in. (Including our optional 40Mb internal hard disk drive.)

We've even included some MacMemory standards. Like MaxSave,™ a recoverable RAM disk that lets you work at RAM speed — without the risk of losing your data in the event of a system error. Plus an additional power supply, an internal fan, and a full two-year warranty.

And perhaps the most important MacMemory standard of all — our commitment to giving you the most for your money. Which is why we priced TurboMax at under $1300. Because, after all, power — and speed — do have their price. But who said it had to be expensive?

SPECS:

16MHz 68000 CPU • 16MHz 68881 Math Co-processor (optional) • 1.5Mb additional RAM (Expandable to 4Mb) • "Super-speed" SCSI (adds SCSI to Mac 512KE) • MaxSave recoverable RAM disk • High-performance power supply and fan • 40Mb internal hard disk drive (optional)

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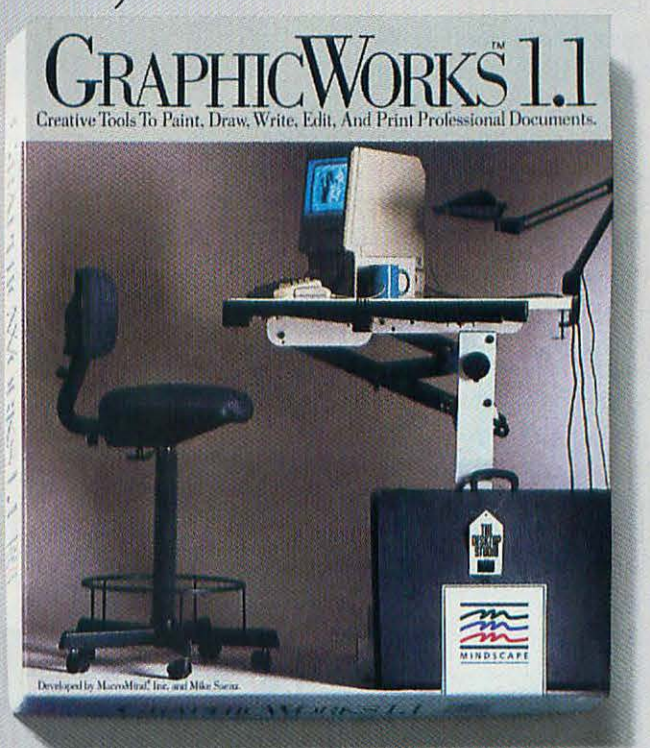
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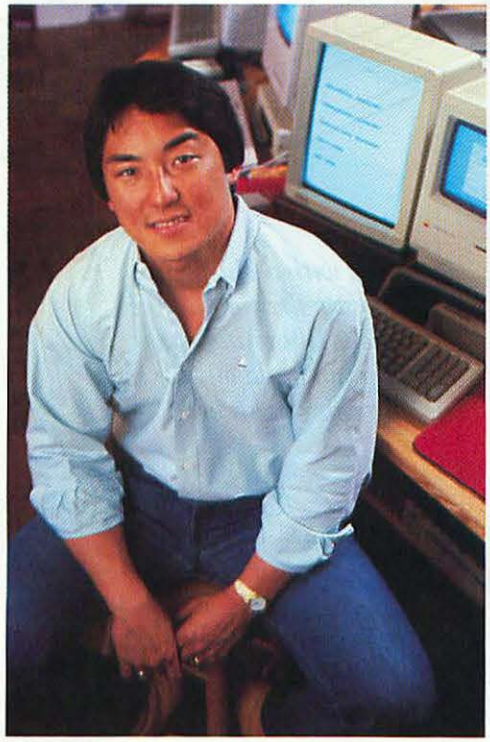
Apple and the Software Industry

When should a computer maker get into the software business?

Apple's role as a software developer is a hot topic in Cupertino these days. The very fact of the controversy is remarkable—most computer manufacturers consider internal software development a dead issue. Few of IBM's customers expect Big Blue to produce software for IBM PCs, programs that would rival those developed for the PC by third parties. Even IBM, with a scientific and technical research staff of thousands, doesn't have the knowledge and experience to keep up with all the smaller companies that specialize in the markets supported by IBM computers. This analogy may be odious, because few of us want *our* computer company to emulate the lumbering, impersonal monolith that IBM has become. But in this case, it's worth considering why Apple should cross the industry's traditional hardware/software line.

Originally, when Apple launched first the Lisa and then the Mac, the company also rolled out exemplary software to counter the obvious objection to a new computer with a new operating system: "But there's no software for it." With the Macintosh, Apple released *MacWrite* and *MacPaint*. *MacDraw* and *MacProject* followed. These programs were, and continue to be, among the best-selling programs for the Macintosh.

Some people believe that *Write* and *Paint* became important only because they were included "in the box" and that if they were unbundled—sold separately, as are *Draw* and *Project*—they would not do well against non-Apple products. Well, it's been a year since Apple took *Write* and *Paint* out of the Macintosh boxes, and both continue to sell 3000 to 4000 copies each month. What happened? Do the products sell well because they have Apple's imprimatur and its colorful logo? Or do they sell well because they are excellent products that reflect the original vision of simplicity and utility embodied in the Mac? And why have few third-party products fared as well on the Mac? Even *Microsoft Word,* by far the best-selling word processor from a third party, has only sold about 150,000 copies for the Macintosh, representing about 15 percent of installed Macs.



ED KASHI

Now president of Acius, Guy Kawasaki led the wave at Apple, where software applications are moving out-of-house.

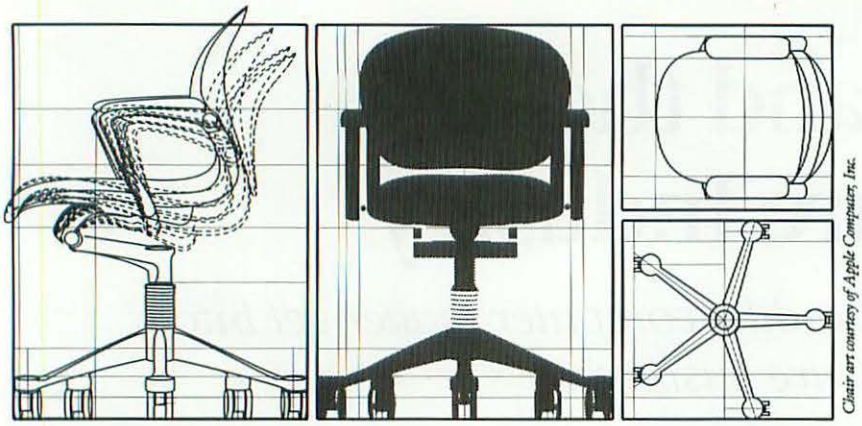
These are relevant questions because the debate at Apple arises partly from the company's assumption that it has a responsibility to provide benchmark products that open up new markets for the Macintosh or that demonstrate new technological capabilities. While the 1984 release of a word processor, a project planner, and a paint program was hardly innovative, *Paint, Project,* and *Write* were outstanding in their adherence to the Macintosh concept, including its user interface. In addition, they were stable and useful products. *MacDraw* stands as a true innovation, having brought something approaching minicomputer-type computer-aided design capability to a desktop computer.

Now, having introduced two new machines, does Apple have the responsibility of demonstrating this new technology? And if Apple does so by bringing out its own software, will it chill development by outside publishers? These questions might best be answered in terms of the market and technology. If Apple were to introduce a database product, developers might legitimately question its motives because there are several database managers already on the market and others—notably *dBase Mac* from Ashton-Tate—still to come. On the other hand, we'd all agree that Apple programmers are the best qualified to modify Mac System software such as the Finder.

Areas of dramatically new technology, such as color, raise the most questions. The case can be made that Apple engineers, having designed the video card that will surely be the most popular graphics card

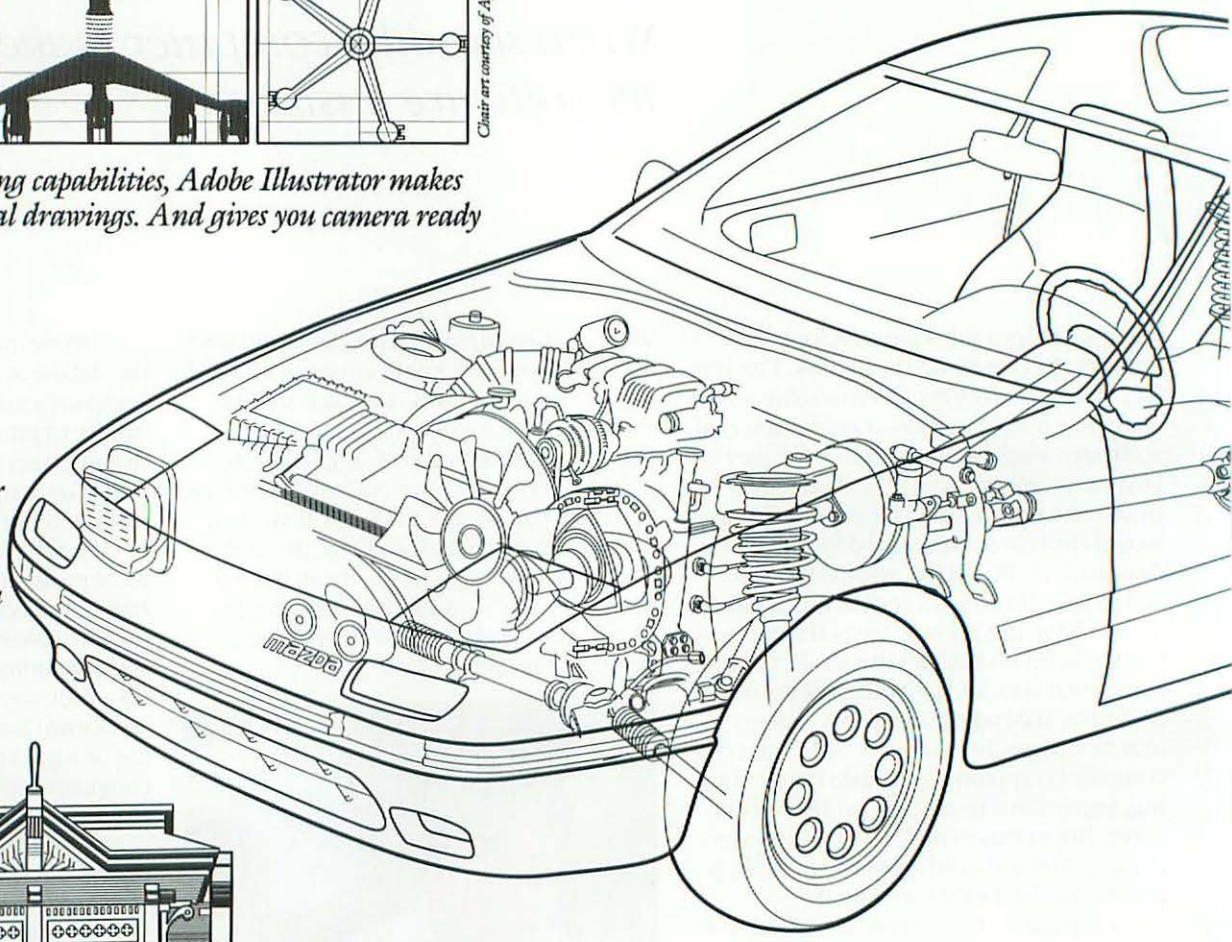
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Chair art courtesy of Apple Computer, Inc.

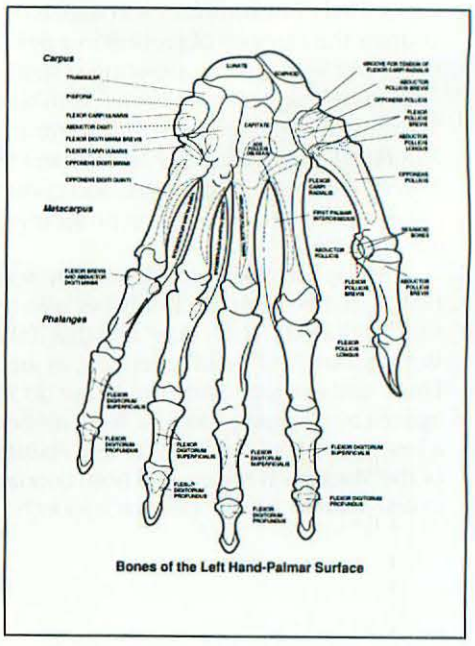
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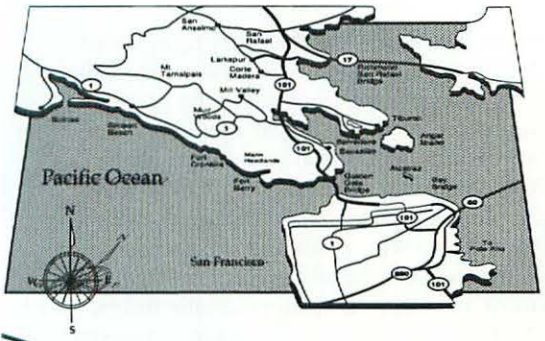


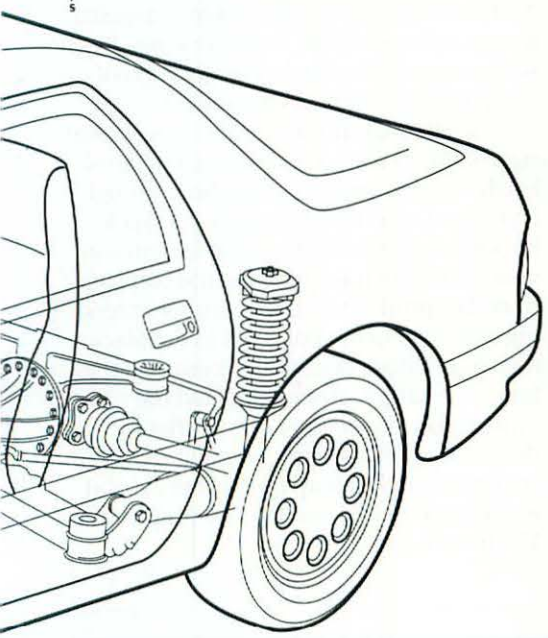
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ED KASHI

Mark Cutter, father of MacDraw, *continues to guide graphics software.*

for the Mac II, are uniquely qualified to develop a software product that takes full advantage of its capabilities–either an extension of an existing program, say color *Draw,* or something entirely new.

But in-house design is not the only way to develop excellent programs for new technology. When AT&T's Electronics and Imaging Labs released its line of Targa image-processing cards for the IBM PC family, AT&T contracted Island Graphics of Sausalito, California, to develop paint programs for the cards. AT&T, unlike IBM, is known for its ability to innovate. (AT&T's problems lie in marketing.) But comparing AT&T to Apple may not be apt. Apple is young and robust enough to carry off both hardware and software innovation.

As a consequence of the debate, Apple decided to withold four software products when it announced its new hardware in March. At least one of those programs, a database manager code-named Silver Surfer, has returned to its source. Apple had obtained the rights to market the product, published in France by ACI under the title *4th Dimension.* The program's developers have founded Acius stateside to market the database manager. Guy Kawasaki, original head of the evangelist group at Apple, will become the new company's president.

Ashton-Tate and others, such as *Omnis 3* publisher Blyth and *Helix* publisher Odesta, reportedly brought considerable pressure to bear on executives at Apple. They wanted to prevent *4th Dimension*'s release under the Apple label. Apple, by not releasing the product, seems to have agreed to leave mainstream software products to independent developers. This move will surely encourage developers, who live dangerously enough without competition from Apple. Nor will those who need a new database manager suffer, because the product will soon be available.

Which brings us back to the original question of how far Apple should go to ensure for us, Macintosh buyers and users, that the Mac realizes its potential. Already, Apple does more toward that goal–with its evangelists who enlist and support software and peripheral developers–than most any other hardware manufacturers. And the expansion of the Apple evangelist group under Kin Seto is encouraging. But some issues–like the thorny question of compatibility–remain unresolved.

Apple is taking on these issues. A clear sign of that is the production of Macintosh hardware that cannot be reached through an upgrade path. Now Apple must tackle backward compatibility of the System software: how much longer does the company intend to produce system software extending across all of the products in the Macintosh line? Those of us who invested in the first generations of Macs applaud the universality of system software. But by demanding this of Apple, we may be obstructing another leap forward in capability like that represented by the original Macintosh. □



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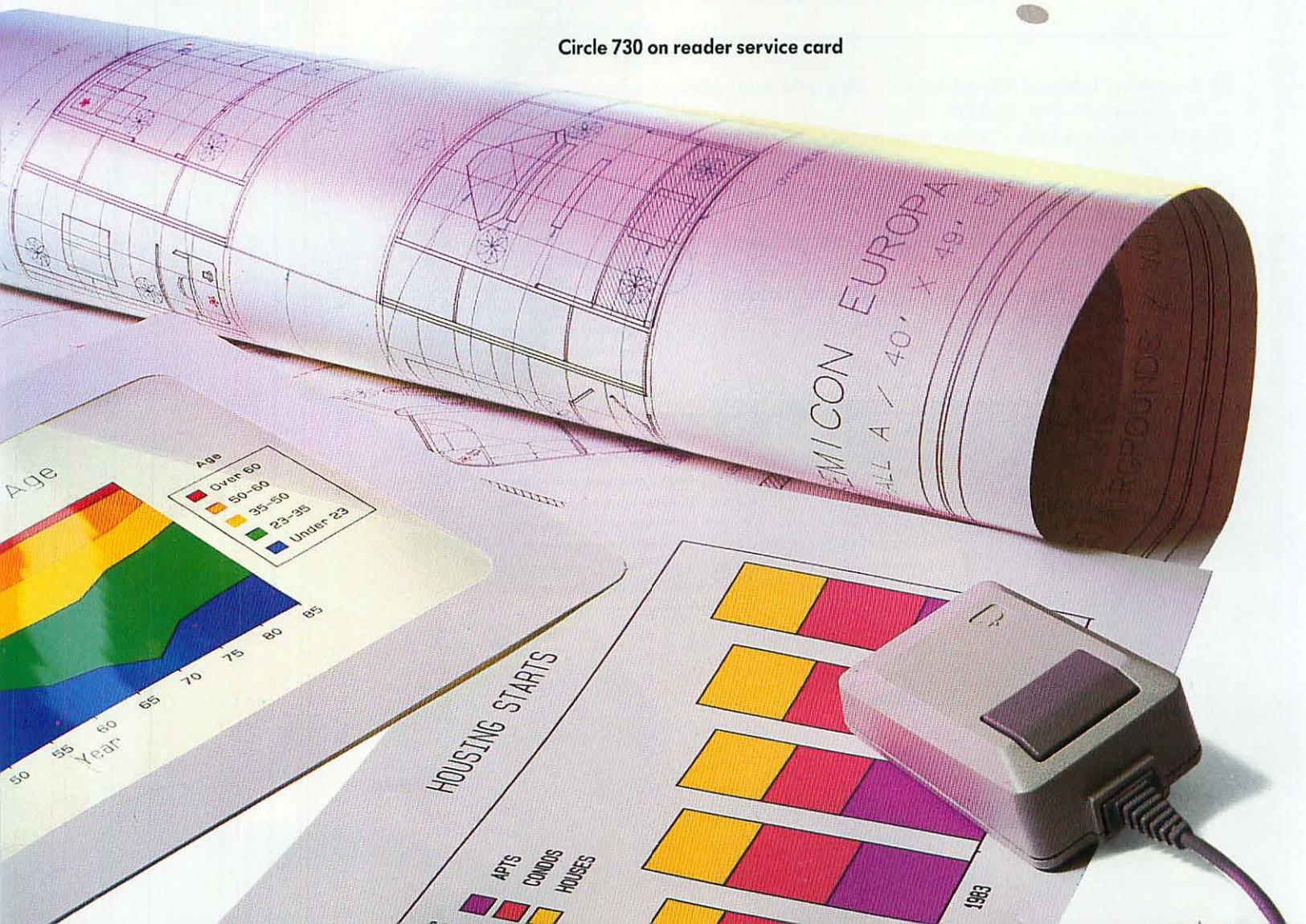
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Contributors Notes

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Ric Ford *("Raising the Roof on Storage") worked with a variety of large computers, from IBM mainframes to DEC VAXs, before falling under the spell of the Macintosh. He edits and publishes the* MacInTouch *newsletter, and he's developing a Mac music application when he's not on line in the ICONtact user group at Delphi.*

David L. Foster *("Scanning the Horizon") is a biochemist at Genentech, Inc., a biotechnology company in South San Francisco, California.*

Adam B. Green *("Into the 4th Dimension") has been teaching, writing about, and evaluating microcomputer database software since the early days of* pfs:file *on the Apple II. He now travels coast to coast teaching classes on* dBase *and looks forward to the day when he can begin leading* 4th Dimension *seminars.*

Nanci Hamilton *("The Modem Marketplace") manages the marketing communications group for a voice-and-data communications firm in Portland, Oregon. Her book* The Macintosh Notebook: Multiplan *was published in 1985 by Prentice-Hall.*

Jim Heid *is a contributing editor of* Macworld *who has been writing about the Macintosh since its introduction. Each month he takes a look at fundamentals in the* Getting Started *column. He is author of* dBase Mac in Business, *brought out this year by Ashton-Tate Publishing.*

Steven Levy *("Where Are the Heavy Hitters?"), whose column appears each month in* Macworld, *is the New York-based author of* Hackers: Heroes of the Computer Revolution, *now published in paperback by Dell. His enthusiasm for baseball is all out of proportion (unfortunately, he favors his hometown team, the Philadelphia Phillies) and a welcome diversion from his current book project about a sixties radical accused of murder.*

Lon Poole *("Into the 4th Dimension") has been educating Macintosh users since the machine was introduced. Every month he answers readers' questions in his* Quick Tips *column. His books include* Mac Insights, *a collection of tips published this year by Microsoft Press.*

Charles Seiter *("Insights on Microsoft Works") is a chemistry professor turned computer writer who telecommutes from his woodland home in Willits, California. His published works include* The Skeptical Consumer's Guide to Used Computers *from Ten Speed Press and books on Pascal and computerized financial planning for Addison-Wesley.*

Stuart Silverstone *("The Architect's Apprentice") was trained as an architect and has taught computer graphics and visual communications in the architecture department at MIT. Formerly a graphics designer for the UPI News wire service, he now consults on Macintosh graphics.* □

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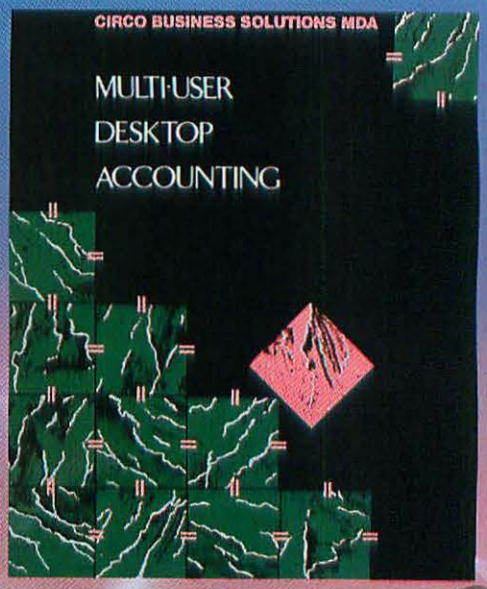
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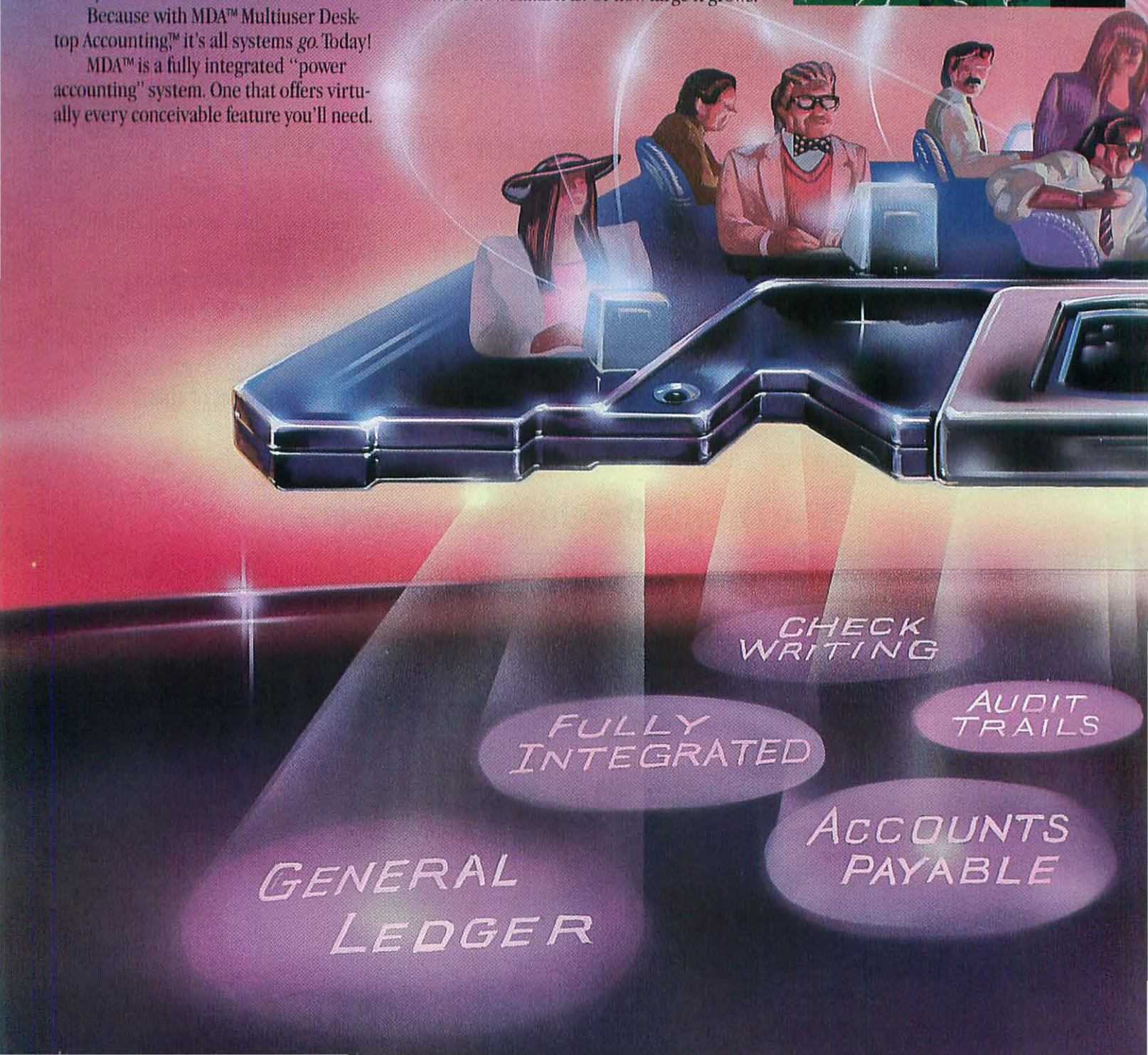
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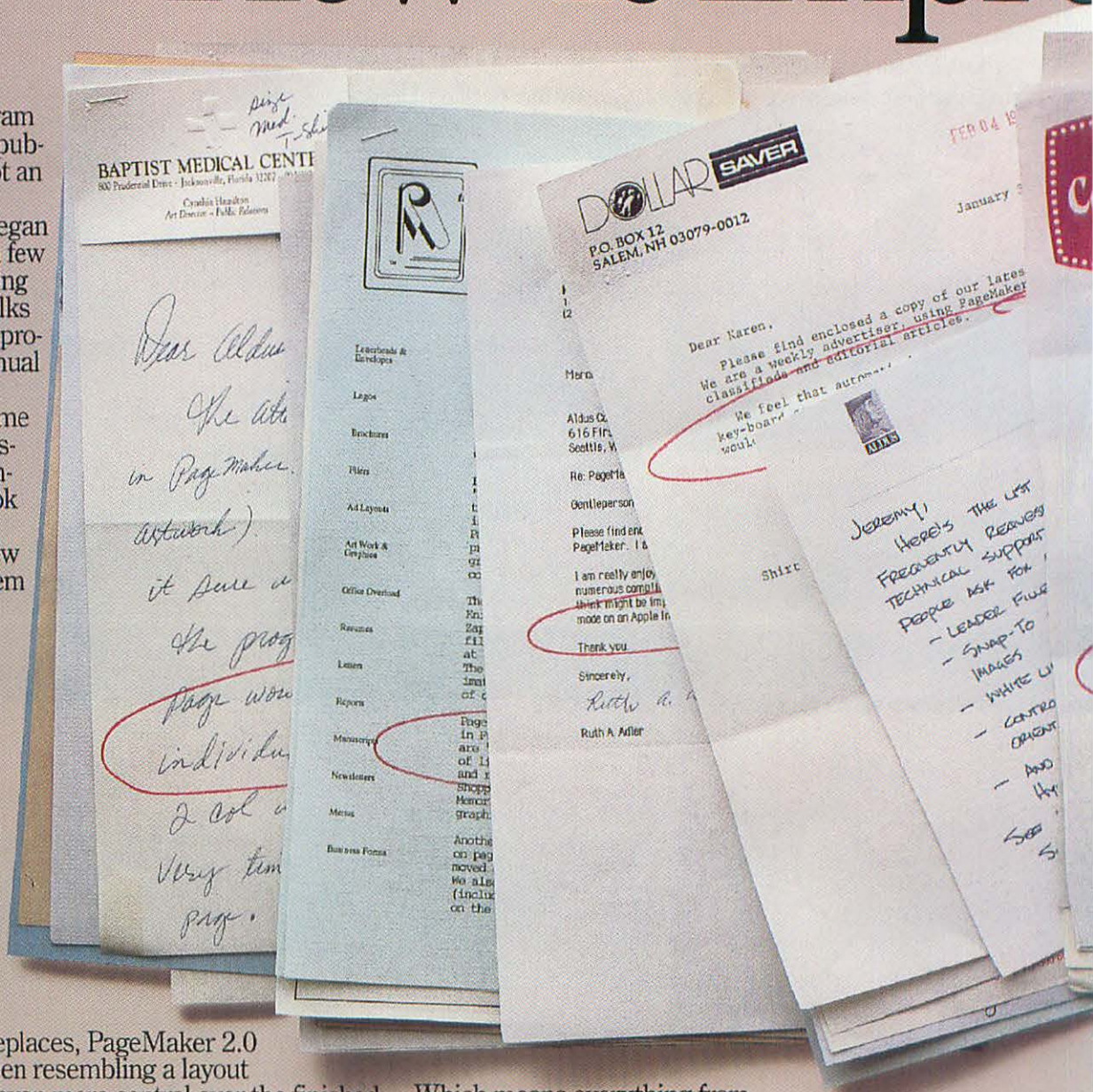
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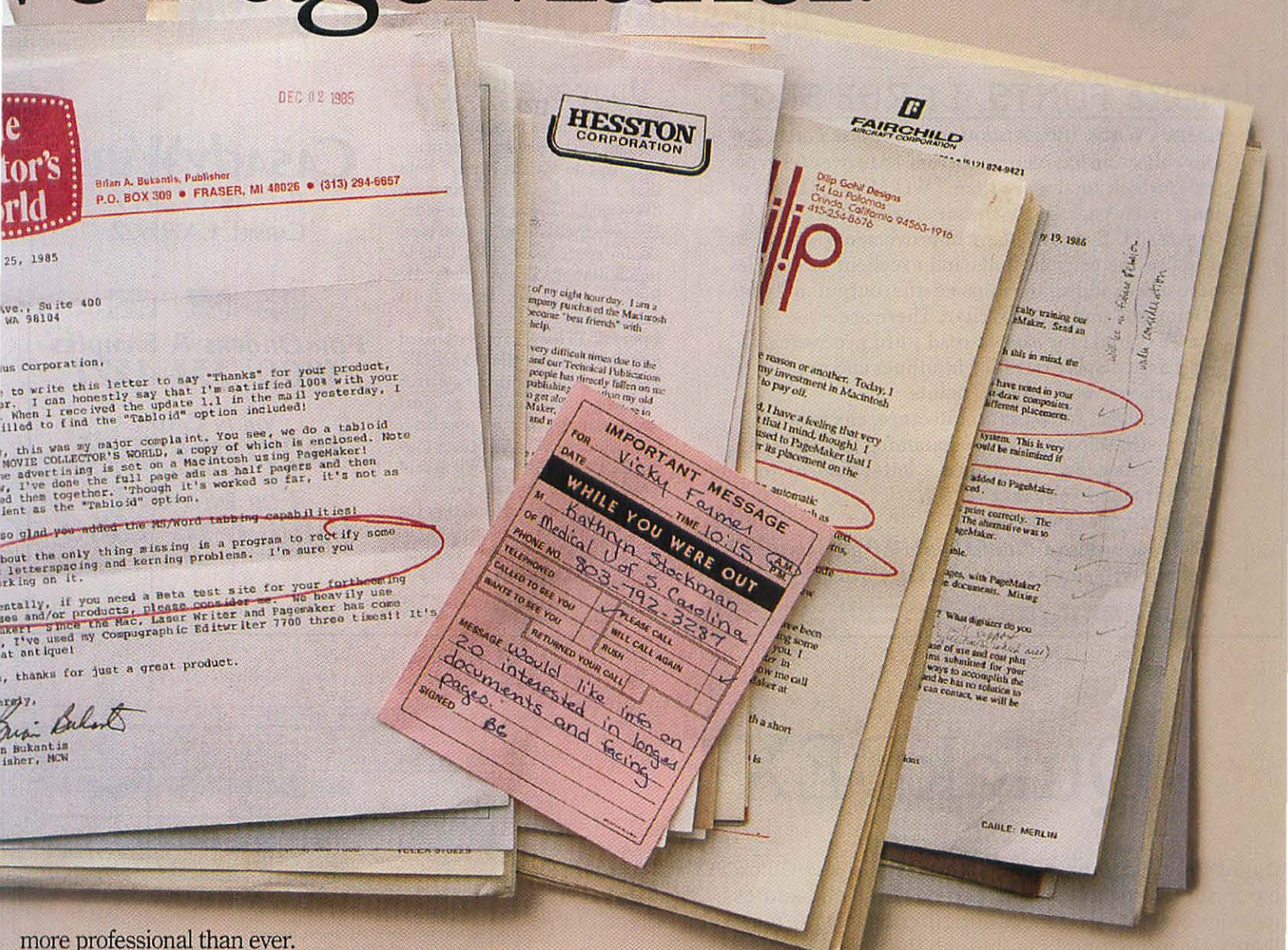
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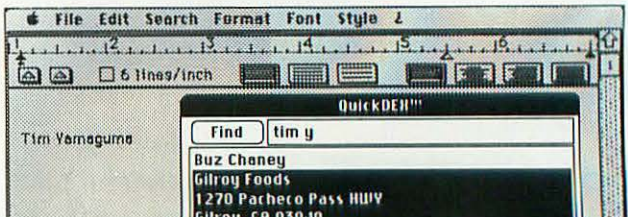
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Steven Levy

Where Are the Heavy Hitters?

When it comes to games, the Mac lacks bench strength—but some rookies might change things.



MAX SEABAUGH

When the Macintosh first came out, Apple Computer was extremely sensitive to the charge that the machine was a cute little item not suitable for serious applications. The Apple corporate nightmare seemed to be that people would dismiss the new product as a computer that was nice for playing games and charting biorhythms but not for zipping through spreadsheets or creating business reports. As a result of this fear, Apple held back *Through the Looking Glass,* a nifty chesslike game, months after it could have been released, and Apple's evangelists, responsible for recruiting a base of software developers, did not do much to enlist entertainment software companies in their crusade.

While this may have been a strategic imperative in positioning the Macintosh as a business machine (which could not be successful anyway until Apple empowered the Mac to handle those heavy-duty tasks), it limited the potential of the Macintosh to be in the vanguard of computer gaming. The fact is, despite the cuteness factor, the Macintosh had some built-in handicaps in that field. Its display was black-and-white, and games make good use of color. It used a mouse instead of a joystick, and a mouse makes a clumsy controller in real-time games. It suffered in responsiveness because even the powerful chip inside it was often not up to the demands of handling the Mac interface along with a game's screen animation, sound, and input from a user. Finally, the complexity of the Macintosh system made software development an arduous and expensive proposition—worth the price for a developer of a high-ticket business program, but questionable for a game.

So although the first wave of Macintosh owners were very hungry for games, it took months before good ones began to appear. Some games, in fact, were very, very good, taking full advantage of the sharp graphics and the easy-to-grasp interface. But while the quality was high, the quantity has been disappointing. After three years of software, it's clear that the number of great games available on the Macintosh does not approach the number available on even the simplest of computers, the Commodore 64. And now that the Amiga and the Atari ST series are approaching critical marketplace mass, there is a danger that the Macintosh will always be second-rate in the entertainment category.

I suspect that upon reading this less-than-earth-shattering jeremiad some of you are thinking, so what? I will tell you so what. Any student of computer software—and this applies to mainframe computers as well as to personal ones—is aware that no genre of program puts as much demand on a machine as a terrific game. The fascination of a game often rests on its ability to emulate a world entirely different from

(continues)

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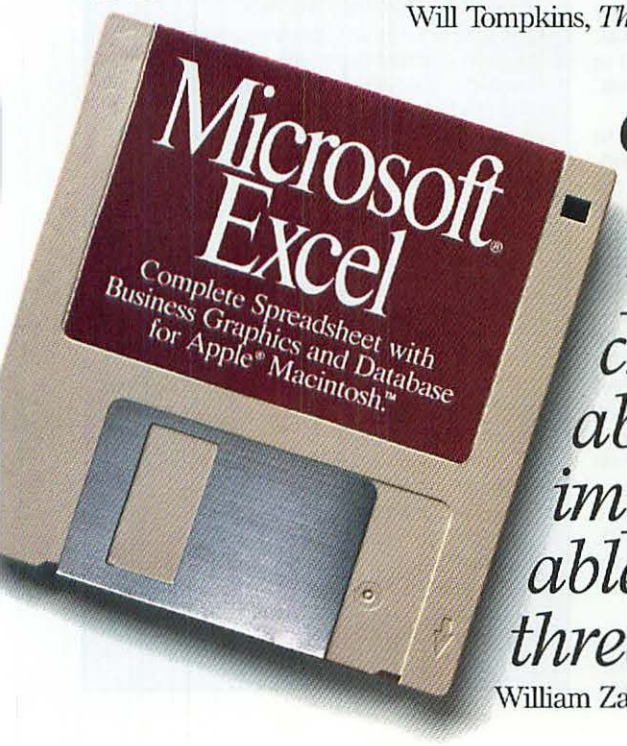
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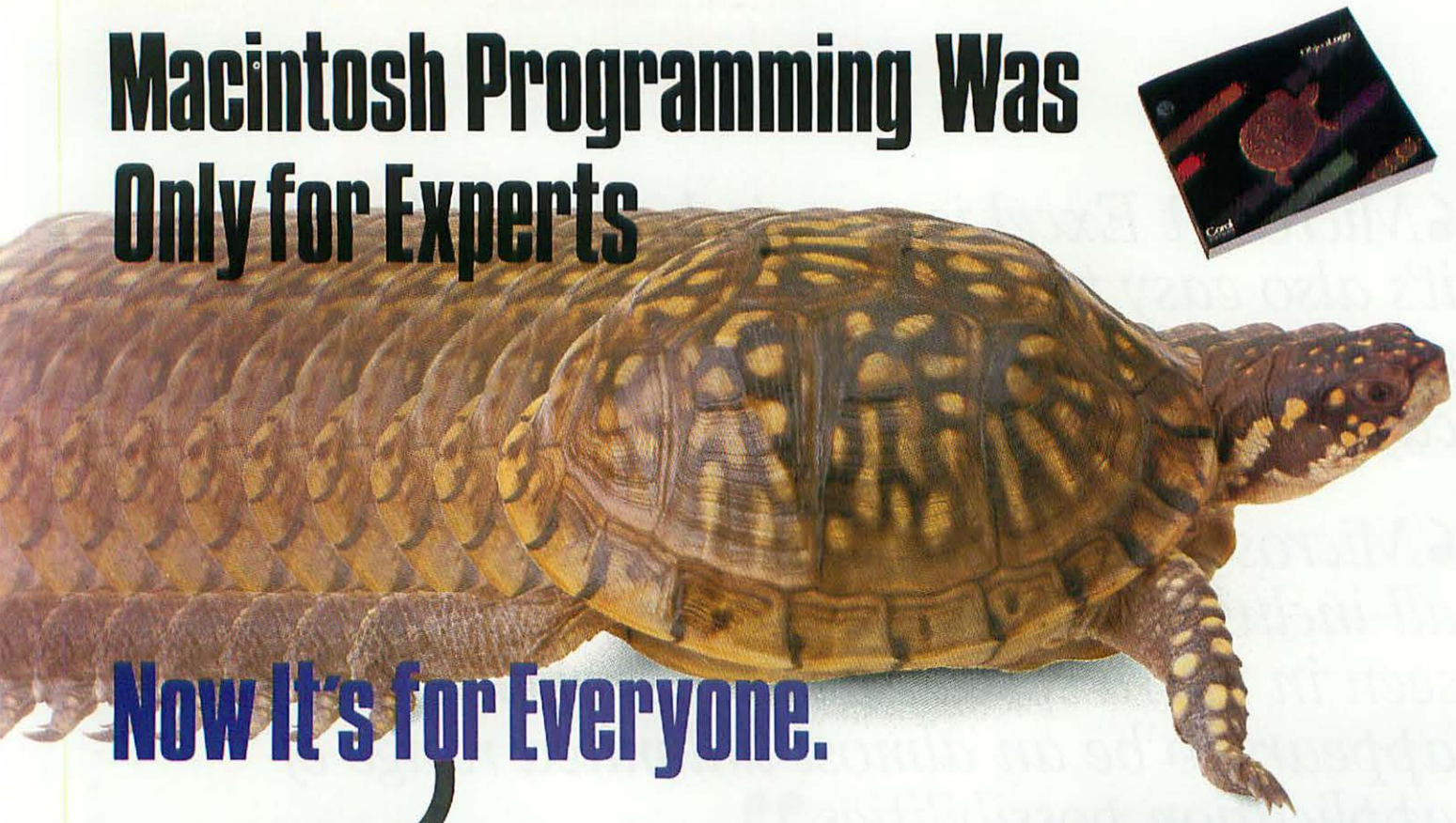


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that of numbers and letters–which go on the computer screen more easily than space shuttles, monsters, and airports. To successfully simulate a wider reality, a game programmer must squeeze every ounce of computer power from a machine. New, sometimes daring techniques must be developed. And once these techniques are discovered, people who program database managers and word processors see how these things are done and improve subsequent iterations of their own programs. Eventually, the entire software base benefits from the innovations of avant-garde gamesters.

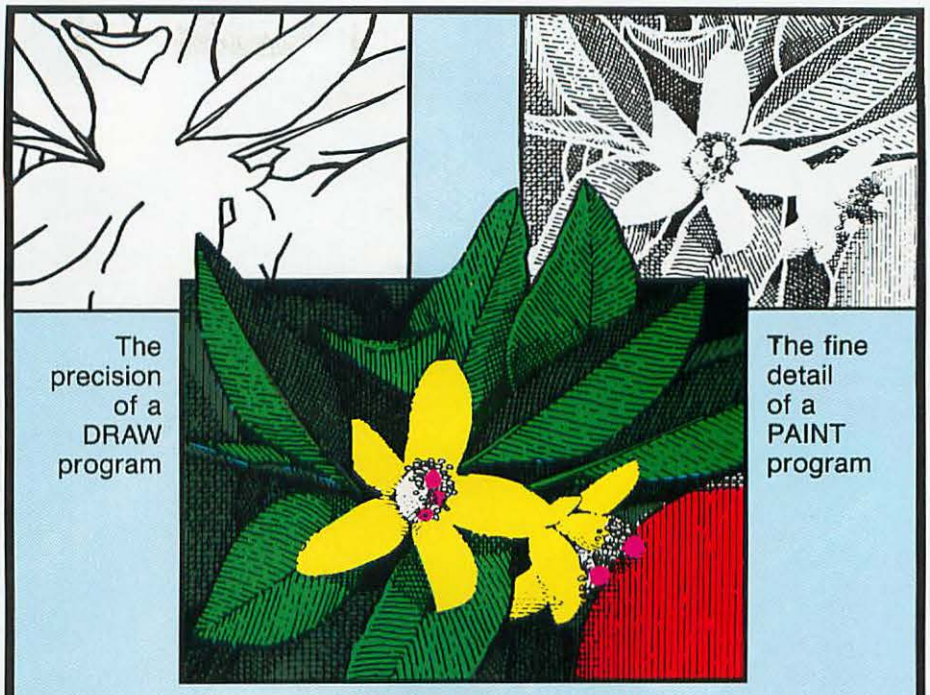
It Happens Every Spring

My thoughts on Macintosh gaming were spurred recently by, of all things, the coming of spring. That means, of course, baseball. Since my daydreams of major league competition have gone the way of the 8-bit computer, I participate in the national pastime by vicarious pursuits. Among them are baseball simulations. It seemed reasonable to expect that the Macintosh would have a fine collection of baseball games. After all, baseball fanaticism has attained a yuppie vogue of late, and what computer usership is more attuned to the latest trends than the Mac's? Also, baseball is not such a horridly complex sport that the limitations of the Macintosh would preclude a workable facsimile.

Computer baseball games fall into two categories, with varying degrees of overlap. The first kind, perhaps easier to execute on a computer, takes the statistical-strategy approach. Using the actual names and simulated performances of major league players, these games allow you to manage "real" baseball teams, giving you not only the strategic options but also the same personnel that big-league managers have. The second kind of game, tricky to produce, is more arcadelike; it tests not only baseball strategy, but also *your* physical abilities–hand-eye coordination in hitting and fielding. The pitcher/hitter conflict usually comes to the fore here.

Literally dozens of baseball games for various computer systems crowd the field. In the "strategy" category, the best software for other machines is *APBA Baseball,* available on the IBM PC and Apple II; and *MicroLeague Baseball,* which runs on the Commodore 64, the Atari 800, and the Amiga, as well as the Apple and the PC. A new game that looks good is *Earl Weaver*

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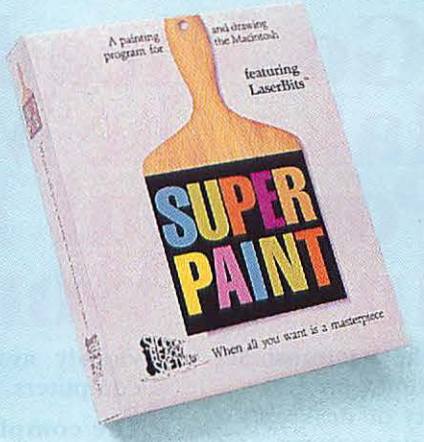
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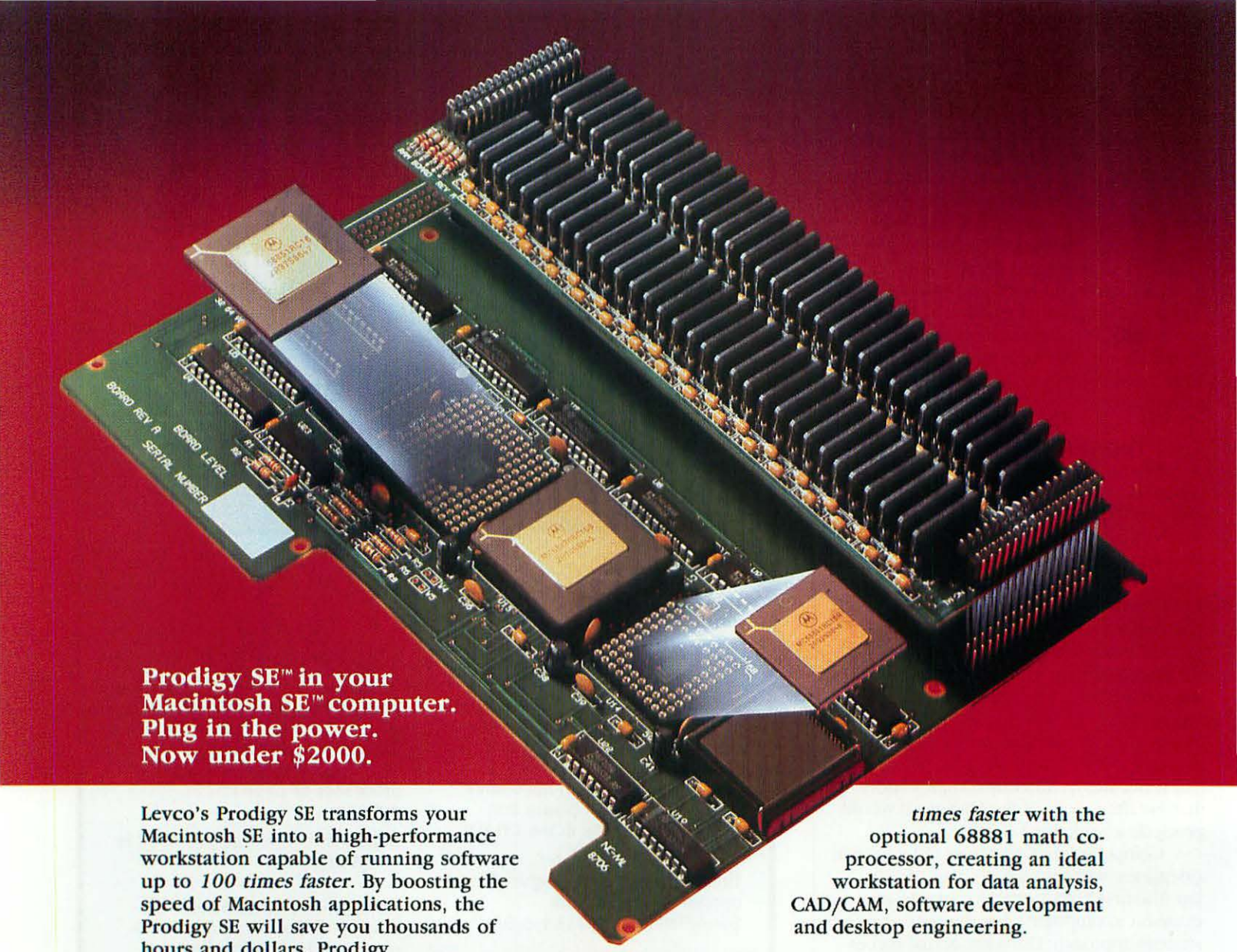
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Baseball. Other contenders include *Radio Baseball, The World's Greatest Baseball Game,* and *Pure-Stat Baseball.* The arcade category is topped by a game called *Hardball,* the clear choice over several other contenders.

How many games does the Macintosh owner have to choose from? As the 1987 baseball season began, three. And two of them have been released only since last year's World Series ended.

This is typical of the Mac game drought. Why this pathetic selection? Charlotte Taylor of Electronic Arts—a company that prides itself on being on the cutting edge of gaming—puts it succinctly. "We hardly bring anything to the Mac first. The Mac is a machine for the office; there doesn't seem to be an interest among Mac users for games." Taylor insists that, personally, she loves the Mac. "I use it at my desk, and I'd die without it. But I don't play games on it." And, most damning of all: "Mac games don't sell that well. Our most popular Macintosh game, *Pinball Construction Set,* did extremely well considering the installed user base, but on the C-64 it did four times better."

In other words, don't hold your breath waiting for Electronic Arts to convert *Earl Weaver Baseball* to the Mac.

Nor should you hold everything until Random House Software writes a version of *APBA Baseball*—the Rolls Royce of baseball simulations—that will run on a Macintosh. For a variety of reasons, a Mac version is "on the back burner," says a spokesperson.

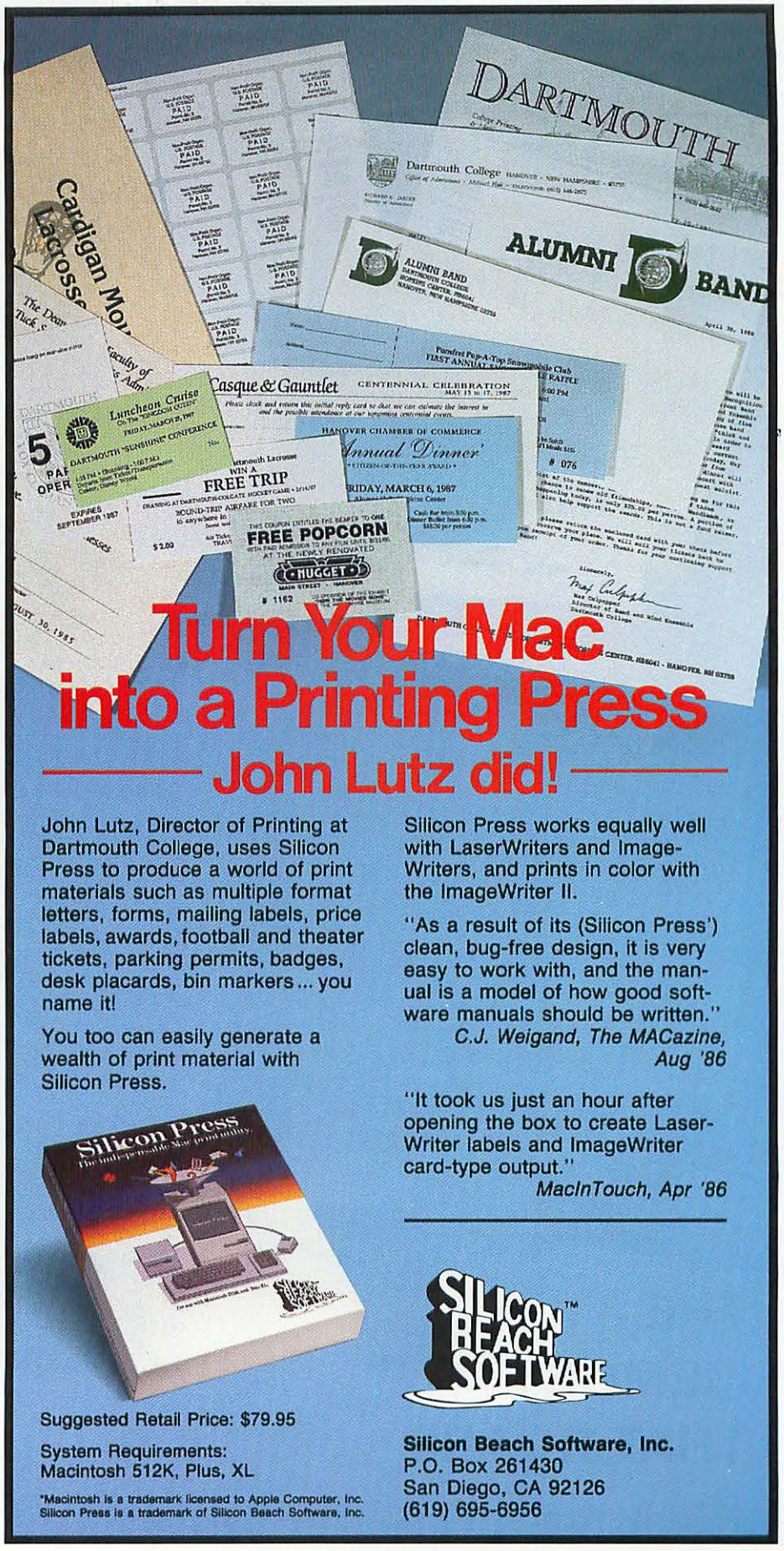
Even Sublogic, a firm known for developing the brilliant *Microsoft Flight Simulator,* has no plans to convert its clever *Pure-Stat Baseball* to the Mac. VP Norm Olsen notes that it's much easier to convert software to other systems, even to the Atari ST or Amiga.

So what *do* we have?

Batter Up

Leadoff batter is *MicroLeague Baseball,* published by Gamestar (now a subsidiary of Activision). This is an arcade-style program translated from a colorful Atari 800 version. It is decidedly less compelling on the Macintosh. The graphics are adequate; the single view is that of the entire playing field, as well as some of the packed grandstand—all squeezed onto the Mac screen. The players stand less than an inch high and are rather crudely represented.

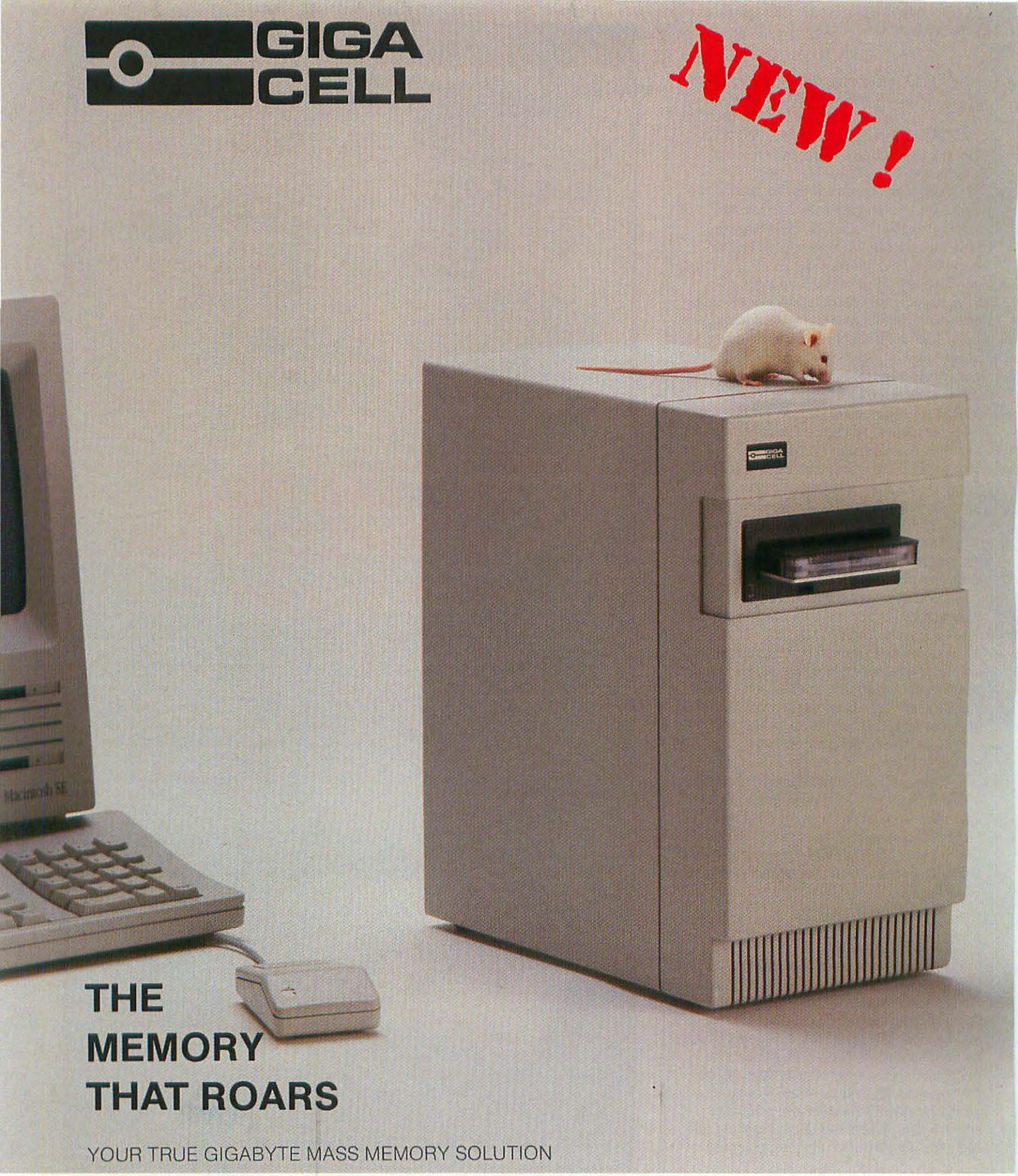
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The fielding team uses the mouse to select a pitch, and the ball wafts to the plate rather unimpressively, at which point the batter hits the space bar to make contact. Fielding the ball with the mouse is awkward, but eventually you get the hang of it. There's not much sophisticated strategy, but this is baseball–and, as games go, the setup is adequate. Play against the computer is tough; so tough that if you beat the computer and send a screen shot to the manufacturer, you get a certificate.

One frequent occurrence, especially when you play against the computer, is a ball hit to right field that results in a force-out at first base. This is an outrage. Next batter up.

Computer Baseball. I had a soft spot for this one because it was the first game I purchased for my old Apple II+, more than five years ago. For that era, the strategy-style game that uses teams from noted World Series matchups performed quite nicely. On the Macintosh it is a disaster. SSI, *Computer Baseball*'s manufacturer, released the game programmed in the antique BASIC language. This not only makes play slow and unforgiving, but this particular version eschews things like menus and dialog boxes when asking for input. At times it freezes up if you do not properly capitalize a word. Even though graphic representation in a strategy game need not be elaborate, the graphics here are akin to cave art. It's a shame, because the strategy options available in this game are comprehensive. If you put up with the faults, you can play a swell nine innings. But the faults are too much to put up with.

Clutch Hitter

That's two out. But as noted hacker Yogi Berra once said, "The game isn't over till it's over." A last-minute pinch hitter is always capable of turning things around. Finally, a hit. *Hardball.*

The publisher is Accolade, a young firm that has quickly made a name for itself in computer games–all without bothering with the Macintosh. Peter Doctorow, Accolade's VP of design and development, admits to a wariness of the Mac market. "Mac users do not generally have the need or desire or time to play with entertainment software," he says. (Although upon being questioned, he admits that there is no hard research to prove this statement.)

Yet Accolade thought that *Hardball* might be an exception. The game had done

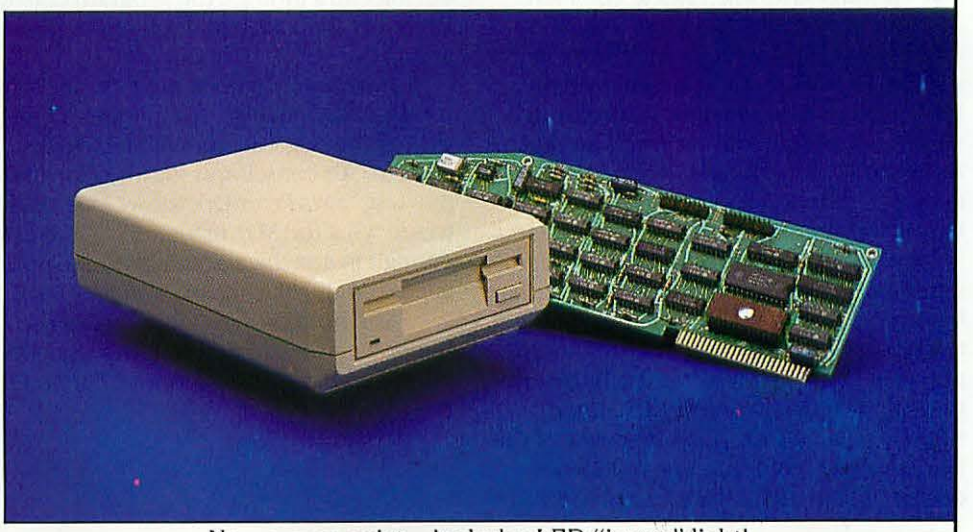
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very well in previous incarnations, and Doctorow opined that Mac users might appreciate how well it simulates baseball. Fortunately, Accolade did not approach the Mac halfheartedly. Much as a baseball team sends out scouts to evaluate the opposition, the firm took a hard look at the Mac and determined how to modify the game to take full advantage of the computer. Accolade also allowed much more time than the usual 4 months it takes to convert a game from one machine to another; the Mac version took 11 months to complete.

As a result, Mac *Hardball* joins the elite class of top-notch games (*Wizardry* is a prime example) that run better on the Macintosh than in previous best-selling versions. And they run very well indeed. *Hardball* is of the arcade genre, best played by two opponents (though it is not impossible to play the computer to a standoff, if you concentrate), and more than any other game it duplicates the mental warfare between pitcher and batter. Heightening the verisimilitude are wonderfully sharp graphics. The pitcher-hitter-catcher view from an imaginary center-field camera shifts to a panoramic press-box view of the field after the ball is hit. The motions required to field the ball are easy to perform with the mouse. The sounds are digitized baseball sounds—the ball snapping off the bat, the base runner sliding home, the umpire howling, "Steee-rike three—*out-ta there!*" Hook up the Mac to your stereo and you're in the ball park.

As a baseball fanatic, I have only a few cavils with the game, but none so serious that it has prevented me from often challenging my friends to a seven-game series with modest funds at stake. The only truly dire problem is that if a visiting team scores during extra innings, the program crashes. Even this is not so bad if you're the home team.

Hardball has done great business on the Mac—so much so that it might begin to dispell the negative aura of Macintosh games. "We consciously viewed *Hardball* as a test," says Peter Doctorow. "We wanted to see what the Mac market did." It did well enough to convince Accolade to do more games on the Macintosh.

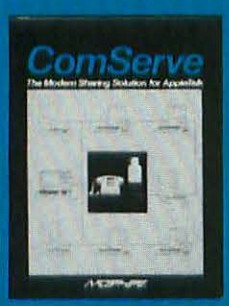
And hold on, fans—from out of the bullpen comes another hopeful sign. *MicroLeague Baseball,* one of the better baseball strategy games, is finally going to appear in a Macintosh version. "True, [the Mac] is not an entertainment machine," says Paul Kelly, a MicroLeague executive, "but we think that Mac owners will appreciate an intellectual game like ours." Kelly is impressed by the Mac version of *Hardball* and vows that his game—due to ship by late summer—will have equally stunning graphics and sound. In a strategy-based statistical game, that's almost unheard of.

All of this is encouraging. Could it be that the bad rap the Mac has been getting in entertainment software is undeserved? A self-fulfilling prophecy? Will baseball help save the Mac as a gaming computer? Will the million-plus user base convince developers that enough of a market exists to justify the added expense and effort required to convert their games to the high standards of Macintosh?

It's a long shot. But as anyone who watched the sixth game of the 1986 World Series can tell you, sometimes the near-impossible can happen. Let's just say that Mac games are having a late rally. And that the game's not over till it's over. □

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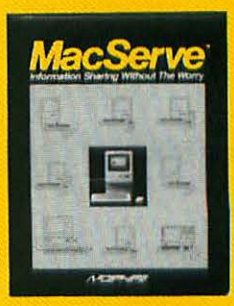
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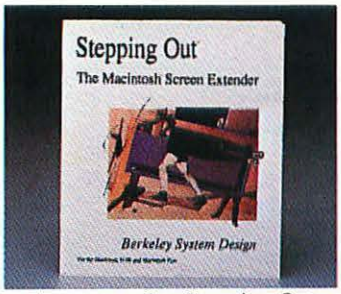
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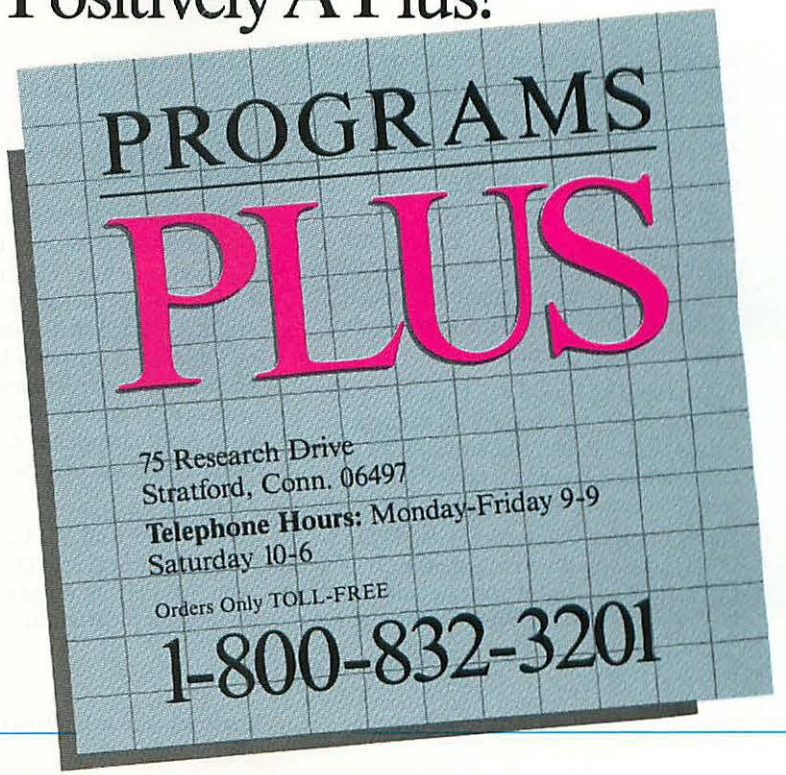
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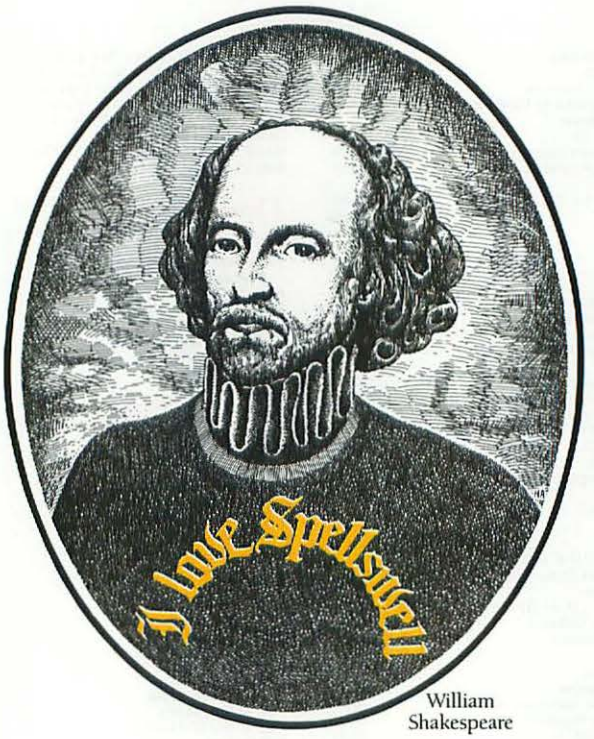
Accessories

A.M. Products	
3½" Head & Computer Cleaning Kit	18.00
Bech-Tech Fanny Mac	69.00
Cambridge Automation	
Numeric Turbo	99.00
Curtis Manufacturing	
Diamond-Surge Suppressor-SP1	29.00
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Ruby-Surge Suppressor-SPF-2	55.00
Sapphire-Surge Suppressor-SPF-1	47.00
Ergotron	
MacTilt or MacTilt SE *(Platinum Color)*	75.00
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MacBuffer *1024K*	429.00
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Flip 'n' File II/Micro	18.00
I/O Design	
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MacPlus Carrying Case	69.00
Macintosh SE Carrying Case	79.00
ImageWriter II Carrying Case	59.00
Kalmar Designs	
Teakwood Roll-Top Disk Cases:	
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Double Micro Cabinet *(holds 60 disks)*	22.00
Jumbo Micro Cabinet *(holds 135 disks)*	32.00
Kensington	
System Saver Mac *(Beige or Platinum)*	65.00
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Macintosh (Plus) Dust Cover	9.00
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Mouse Pocket	8.00
Mouseway *(Mousepad)*	8.00
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Starter Pack *(includes Tilt/Swivel)*	59.00
Surge Protector	35.00
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Printer Muffler 80	40.00
Printer Muffler 132	55.00
Kette Group	
MacNifty Stereo Music System MNS-300 *(Dolby, Bass, Treble)*	99.00
MacMemory, Inc.	
MaxChill *(Internal Piezo-Electric Fan)*	37.00
Moustrak MousePad 7"x9" Size	8.00
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MAC-B-COOL	89.00
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ImageWriter Ribbon-Black	4.50
ImageWriter Ribbon-Color	5.00
ImageWriter Rainbow Pack *(6 Colors)*	25.00
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Professional Series Carry Cases In Black or Burgundy	
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William Shakespeare

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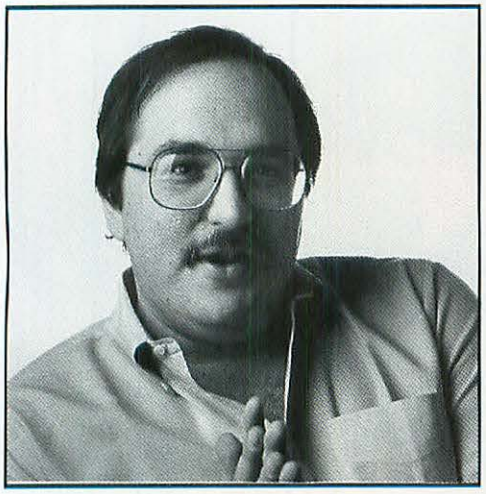
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■ Please ask about **Findswell** and other new programs.

Verbatim

An interview with David Winer, president of Living Videotext



David Winer founded Living Videotext in June 1981 to develop ThinkTank *for the Apple II. His brother Peter Winer joined him to head Mac software development. By a series of coincidences that included almost hiring Guy Kawasaki, who went instead to Apple Computer, Living Videotext became one of the first companies to publish software for the brand new Mac 128K. By now, the company reports having sold more than 100,000 copies of* More *and* ThinkTank *for the Mac, which makes it a force to reckon with in the Macintosh market. As head of a software company with both IBM PC and Apple products, and whose fate has followed the Mac's from the beginning, Living Videotext's CEO offers a unique perspective on the Mac at this turning point in its history.*

How did Living Videotext enter the Mac Market?

When Guy Kawasaki showed me the Mac, my reaction was, let me at it. I realized it was a different kind of computer; everything about it communicated that, from the interface to the CPU.

It was a good window of opportunity. Sales at Apple were at about $1 billion. Apple was fighting for its life because the IBM PC was drawing customers away from the Apple II. The Mac was a kind of second coming. I knew that Mac applications were building a strong launch, and that we could benefit.

The next step after seeing the Mac was to understand it. It was a new architecture–there was no software. It was not clear what *ThinkTank* would be on the Mac. At first we thought we could take the software for the Apple II and add windows like an afterthought. That was a naive view.

When Peter and I got a machine, we decided to spend a weekend to try and get something up and working–anything. We didn't get a single line of code up. It became Peter's full-time occupation, in a locked room with the blinds drawn because the Mac hadn't been launched. We learned then that the product cycle for a good product is eight months.

Ours was the fourth software product to ship on the Mac–after *Mainstreet Filer, Habadex,* and *Multiplan.*

Which are still around?

Only *Multiplan,* I believe. The 128K was the beginning of a process; so was *Multiplan.* The 128K led to the 512K Mac, *Multiplan* led to *Excel.* Immediately after the 128K, we started the 512K version.

Why so fast?

We had to capture the user's imagination. The users wrote letters telling us they wanted more; they wanted word processing, flexible formats, text editing, slide shows.

So your early acceptance of the Mac paid off?

In 1985, sales were awful, computer companies in the Mac market were dying right and left. Certainly Lotus didn't do well and Telos had a bad year. Databases–*MacLion, DB Master, Mainstreet Filer,* and *Habadex*–shrank. *OverVue* was an excellent product, but 1985 hurt its publisher as well. There were no significant product launches that year.

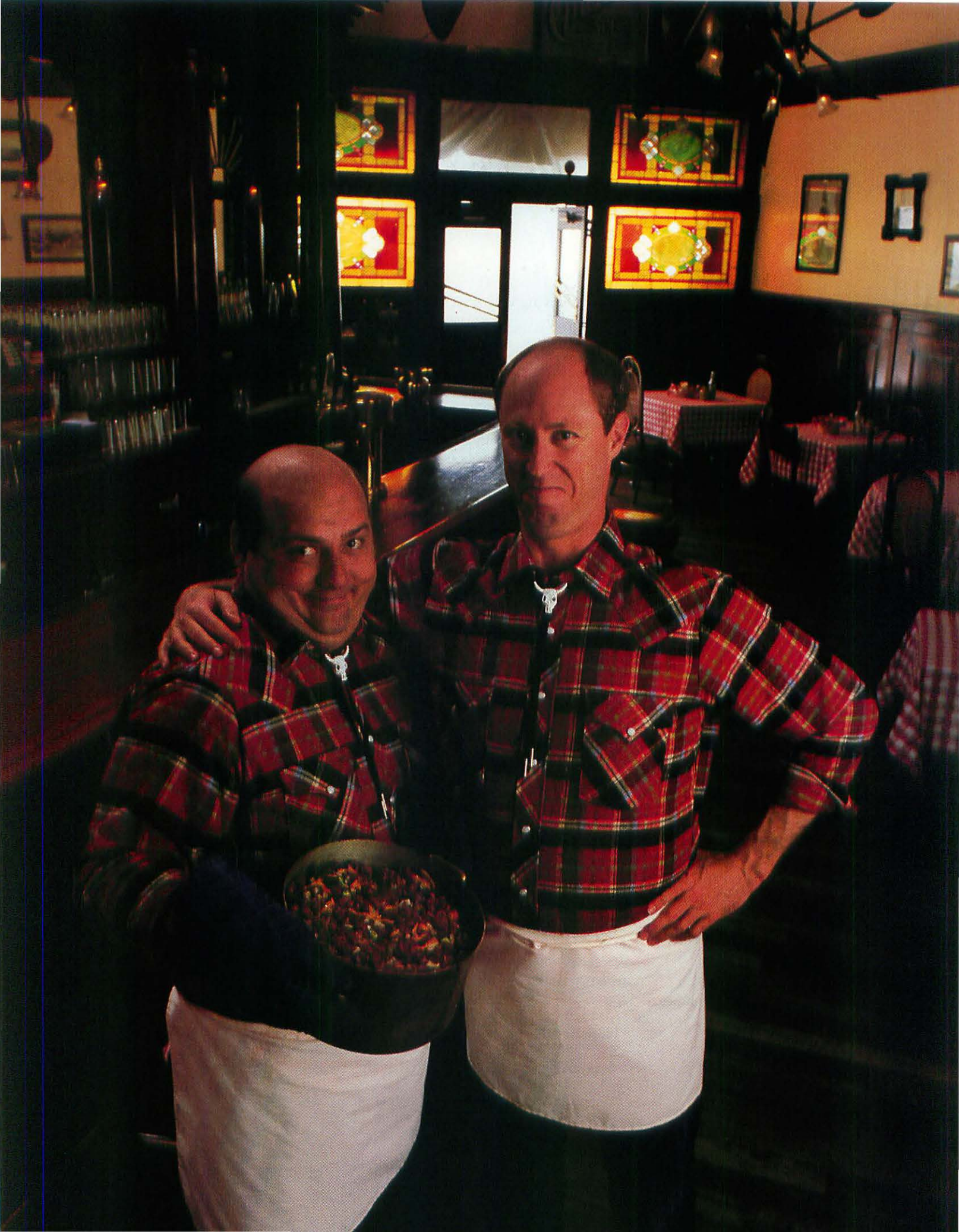
Apple did lots of things that didn't work, like trying to sell 512K Macs against IBM ATs; a 512K machine was inadequate against an AT. The hard drives were slow; there was no hierarchical file system. And not enough memory; Mac applications are bigger memory users than comparable PC products. The 512K couldn't deliver the promise of its software. AppleTalk was then no more than a sophisticated printer cable. *Switcher* didn't work on 512K. Then there was the lemmings commercial.

What are the most innovative products out there, besides your own?

Mac Flow from Mainstay. *Design* from Meta Software. Both are in the same general area of engineering software; that is a fertile ground. Also, the games from ICOM, the people who developed *Enchanted Scepters* and *Déjà Vu,* sold by Mindscape. I love those products. I solved *Déjà Vu* the other day.

(continues)

PHOTOGRAPHS BY WILL MOSGROVE



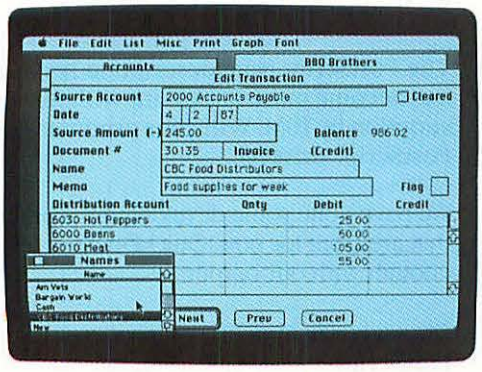
The Barbecue Brothers would rather bake beans than count them.

It's only the best chili in the whole doggone state.

But it might not be, if Larry Keenan and Curt Fischer had to spend more time balancing their books and less time balancing their spices.

That's why they bought In-House Accountant,™ from Migent.

With In-House Accountant, the boys spend very little time entering transactions. Or reconciling bank accounts. Or otherwise analyzing their business's financial situation.



Instead, In-House Accountant does it for them. Automatically, and in a very Macintosh™ kind of way.

That means all the information is right there on the desktop. So the guys can see at a glance things like their checking balance, or the amount they spent on hot peppers last month. They can also call up context-sensitive help windows anytime they need them.

Larry and Curt also like the fact that In-House Accountant, unlike other software designed merely to automate paper-based systems, was developed from scratch to take full advantage of their Macintosh's power.

The result is that when they enter a transaction, all related items in other lists are updated immediately. So there's never a need for "posting." And to handle payables and receivables, the guys simply zip among their various accounts without ever having to change modules, or even close a window.

The program also lets them search for and change any entry in the current fiscal year, so they're not forced to close the books at the end of the month. It even lets them print balance sheets—or reports, with bar graphs and pie charts—anytime they want.

But mostly, In-House Accountant just lets the guys do what they do best.

Which is make the best chili in the whole doggone state.

In-House Accountant. Only $149. See your nearest Migent dealer, or call 1-800-633-3444 if you'd like to receive a free demo disk.

In-House Accountant

MIGENT

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We had thought we could take software for the Apple II and just add windows. That was a naive view.

What are the worst products?

Jazz really hurt the market. Partly the application, partly Lotus's handling of it. It was a formula product, and Lotus's developers got carried away with functionality. They didn't understand the Mac market. Apple promoted *Jazz* at the expense of others and learned a lesson. *Jazz* set the market back almost one year.

When did the Mac turn around?

We saw sales double in April of 1986 on the 512K version for no apparent reason. We investigated and quickly determined that the Plus had stimulated the market.

We sold 50,000 copies of *ThinkTank* for 512K Macs. Figuring that very few software companies had continued to invest in the Mac market in 1985, we decided to take advantage of the lull by combining three planned products in *More*. The market developed, and the investment paid off.

More is an outliner?

More is a writing tool, a list maker, idea processor, controller of details. I'll live with "outline processor" as a description. Two features define the product: the ability to expand and collapse and reorganize according to structure, and the ability to manipulate headlines according to structure. Scrolling, headlines, cross-references, tree charts, bullet charts are all extra.

Outlining is a technology generic to personal computers. In the next few years you'll see outline processors show up in more than word processors.

What about incorporating more traditional forms of graphing into *More*?

We don't generate pie charts, but they can be incorporated into *More* documents through the Clipboard.

We are currently debating whether we should have a separate graphics product or incorporate more capabilities into *More*. We think that *More* is a big product in planning and management, not in production departments. It would be a cop-out for us to give managers something like a tweaked *MacDraw* and still tell them they're going to gain productivity.

What's the worst problem with *More*?

It doesn't do page breaks. My marketing people are going to kill me for saying that. We'll add it in the next release.

The PostScript page-description language has become more important with its adoption by IBM. Will your products have PostScript drivers?

We have done some development work in that area, but for now, QuickDraw is enough with our output.

Characterize QuickDraw versus PostScript.

QuickDraw has color, lines, patterns, and shadows. PostScript gives control and more flexibility; it's more complex code.

Do the two compete?

Yes, to the extent that QuickDraw can drive a printer and PostScript can drive a screen. On the whole, PostScript is good as a page-description language. There is a standard on both PC and Mac sides now, and IBM will begin to offer PostScript printers. We're better off with fewer standards. In addition, it's flattering to see IBM following Apple's lead. Apple is best when it's leading, and this isn't the first time it has led IBM.

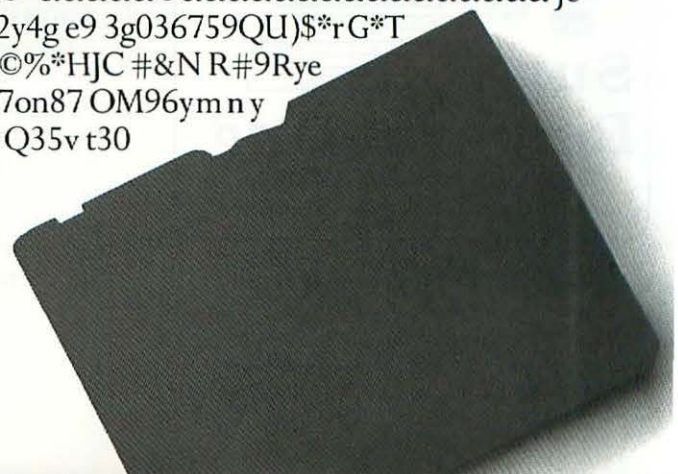
What is it like to develop for the Mac II?

The II is an infinite machine, the first personal computer since the early days that has no limits. It's an amazing feeling. There

(continues)

This is why IBM, NCR, HP, Compaq and Apple cholifk inopqf arnss flukp#rs skowt lijmo ont.

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Outlining is a technology generic to personal computers. You'll see outline processors show up in more than word processors.

is no way to imagine what the Mac II will ultimately look like. I can see 5- or 125-megabyte programs.

Now that there's color on the Mac, and a color version of *More*, how can we produce color output with *More*?

Even on the Macs without color, we interface to two color cameras, the Matrix film recorder and Presentation Technology's ImageMaker. They substitute for the LaserWriter, producing color slides instead of paper printouts. But *More* isn't just a way to make slides; that you could do with *MacDraw*. The user's concern is what to do when you suddenly need to make a project presentation to your board, as happens more often than you'd think. You have to do it well, and you have to do it fast. With *Draw* you can make up five slides in an hour, and that time goes to formatting the graphics, not to thinking. *Draw* and other graphic programs don't help you formulate ideas the way *More* does.

Any predictions on future Mac products?

I think that the world promised by Apple's initial, premature 1985 Macintosh office promotion will begin to come to fruition: networked work groups, maturity in production areas like accounting and database management, and presentations over networks that will go out and come back to the sender. We're moving in that direction—from idea processing to group idea processing. We already have presentations; in the future we'll add group presentations.

How do you foresee the continuing evolution of the Macintosh?

Apple can give us more power in the hardware, that's safe to say. It will add technology through ROM enhancements: color, text editing. Apple can direct machines at specific software markets, but if it loses control of the technology, it will lose its strength in the market. Or if it develops products that compete with its developers. If the standard database comes from Apple, Apple can't talk to other database developers about their efforts.

The key to Apple's success is coordinating the efforts of others. Apple can make things happen, and that's more important now than ever before. The efforts of the evangelists—Guy Kawasaki, Bob Perez, and Kin Seto—are exemplary.

Will Apple continue to produce its own software?

Apple started a lot of software projects in 1985 because the Mac had an apparently small market. The biggest developer in the Mac market—Microsoft—had problems, and Lotus had trouble, so Apple had to develop programs on its own.

I'm sure there are other products coming from Apple, which looks at software as a way to stimulate the market. *MacWrite* and *MacPaint* gave users a reason to use the machine. To date Apple offers considerable competition in software for its machines. But Apple software doesn't compete everywhere: its applications software goes only to retailers who sell hardware. ComputerLand carries Apple software, ComputerWare (a Palo Alto software-only dealer) does not.

In fact, the Mac has many niches offering lots of opportunities. In the PC market there are three main areas: word processors, spreadsheets, and database managers. Then come business graphics. After that there are no big sellers. On the Mac there are *PageMaker, InBox* for communications, outline processors, desktop presentations; niches develop that can support companies.

Maybe we see this because PC owners have stopped buying software in 1987, while Mac users haven't. Mac applications are easier to learn, so their users tend to get more software.

(continues)

This is why IBM, NCR, HP, Compaq and Apple chose 3M data cartridge tape backup.

The preceding page illustrates why the leading personal computer makers needed a reliable backup system for their computers.

And this page illustrates why they chose the 3M data cartridge tape technology to be that backup system.

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Title _____

Date _____

1. Industry (check one only)

Non-computer related businesses

- ☐ 1. Aerospace
- ☐ 2. Agriculture, mining, construction, oil
- ☐ 3. Business consulting (non-computer related)
- ☐ 4. College/university
- ☐ 5. Elementary/high school
- ☐ 6. Engineering/architecture
- ☐ 7. Finance, banking, accounting, insurance, real estate
- ☐ 8. Government
- ☐ 9. Health/medical services
- ☐ 10. Legal services
- ☐ 11. Manufacturing
- ☐ 12. Military
- ☐ 13. Other business services
- ☐ 14. Publishing/advertising/public relations
- ☐ 15. Research & development
- ☐ 16. Retail/wholesale
- ☐ 17. Transportation, communications, utilities
- ☐ 99. Other (please specify) _____

Computer-related businesses

- ☐ 18. Computer consultants
- ☐ 19. Computer retail
- ☐ 20. Distributor/wholesalers
- ☐ 21. Manufacturer (computers, software, peripherals)
- ☐ 22. Service bureau
- ☐ 23. VAR/systems house/integrator
- ☐ 99. Other (please specify) _____

2. Title (check only one)

- ☐ 1. Chairman/president/owner/partner
- ☐ 2. Vice president
- ☐ 3. Controller/treasurer/accountant
- ☐ 4. Director/supervisor/manager
- ☐ 5. Project manager/chief/group leader
- ☐ 6. Art director/writer/creative head/technical writer
- ☐ 7. Engineer/scientist
- ☐ 8. Administrator
- ☐ 9. Consultant/advisor
- ☐ 10. Microcomputer specialist/manager/analyst
- ☐ 11. Programmer
- ☐ 12. Educator
- ☐ 13. Professional (lawyer, doctor, etc.)
- ☐ 99. Other (please specify) _____

3. Department or function (check only one)

- ☐ 1. Accounting/finance
- ☐ 2. Administration/management/personnel
- ☐ 3. Consulting
- ☐ 4. Education/training
- ☐ 5. Engineering/R&D
- ☐ 6. Manufacturing/production
- ☐ 7. Microcomputer center/office automation
- ☐ 8. MIS/DP
- ☐ 9. Purchasing
- ☐ 10. Sales/marketing/distribution
- ☐ 99. Other (please specify) _____

4a. Does your company own or lease any mainframe computers at this location?
☐ Yes ☐ No

	Existing (quantity)	Plan to buy (quantity)
☐ 1. IBM		
☐ 99. Other (specify)		

4b. Does your company own or lease any minicomputers at this location?
☐ Yes ☐ No

	Existing (quantity)	Plan to buy (quantity)
☐ 1. IBM		
☐ 2. DEC		
☐ 3. Sun/Apollo		
☐ 99. Other (specify)		

5. Does your firm have or plan to buy any of the following types of personal computers or microcomputer systems at your location?
☐ Yes (indicate quantity below) ☐ No

Manufacturer	Currently own (quantity)	Plan to buy within 1-12mos	Plan to buy within 13-24mos
☐ 1. Macintosh 128/512			
☐ 2. Macintosh Plus			
☐ 3. Macintosh SE			
☐ 4. Macintosh II			
☐ 5. Apple IIe/IIc/IIGS			
☐ 6. IBM Compatible (Compaq, Tandy, etc.)			
☐ 7. IBM PC/XT/AT/RT			
☐ 8. IBM Personal System/2			
☐ 9. Sun/Apollo workstation			
☐ 99. Other scientific or engineering workstations (non-mini)			

6a. Please indicate your involvement with each of the following types of personal computers or microcomputer systems (check all that apply):

	Macintosh	Micros	Software	Networks & Peripherals
☐ 1. Approve purchase				
☐ 2. Develop/manufacture				
☐ 3. Evaluate/select vendor				
☐ 4. Own (at least one)				
☐ 5. Own (two or more)				
☐ 6. Purchase or acquire				
☐ 7. Establish specifications				
☐ 8. Recommend to others				
☐ 9. Sell				
☐ 10. Train people to use/or provide support				
☐ 11. Use				
☐ 12. No involvement				
☐ 99. Other (please describe by name and quantity)				

If you have no involvement with any of the above, skip to question 8.

6b. For approximately how many total personal computers or microcomputer systems do you have the above involvement? (check only one)

☐ A. 1-3 ☐ B. 4-9 ☐ C. 10-19 ☐ D. 20-49
☐ E. 50-99 ☐ F. 100-499 ☐ G. 500 +

7. For approximately how many Macintosh personal computers do you have involvement described in question 6 above? (check only one)

☐ A. 1-3 ☐ B. 4-9 ☐ C. 10-19 ☐ D. 20-49
☐ E. 50-99 ☐ F. 100-499 ☐ G. 500 +

8a. How many people work at your location? (check only one)

- ☐ A. 1-9
- ☐ B. 10-24
- ☐ C. 25-99
- ☐ D. 100-499
- ☐ E. 500-999
- ☐ F. 1000-2499
- ☐ G. 2500-4999
- ☐ H. 5000-9999
- ☐ I. 10,000 or more

8b. How many people are employed by your entire company? (check only one)

- ☐ A. 1-9
- ☐ B. 10-24
- ☐ C. 25-99
- ☐ D. 100-499
- ☐ E. 500-999
- ☐ F. 1000-2499
- ☐ G. 2500-4999
- ☐ H. 5000-9999
- ☐ I. 10,000 or more

9. What percentage of people who work at your location actually use a personal computer (check only one)

- ☐ A. 1-24%
- ☐ B. 25%-49%
- ☐ C. 50%-74%
- ☐ D. 75%-100%
- ☐ E. None

10. The personal computer purchased for this location would be: (check all that apply):

- ☐ 1. for internal use
- ☐ 2. for resale
- ☐ 99. other (please specify)

11. How are personal computers normally obtained for this location? (check all that apply)

- ☐ 1. direct from manufacturer
- ☐ 2. manufacturer's representative
- ☐ 3. distributor or wholesaler
- ☐ 4. retail computer store
- ☐ 5. mail order
- ☐ 6. VAR/systems house
- ☐ 7. in-house (company or university store)
- ☐ 99. other (please specify)

12. Personal computers or microcomputer systems at your location are or soon will be used for the following communications activities: (check all that apply)

- ☐ 1. Communicate with internal company mainframe or mini
- ☐ 2. Communicate with other micros via modem
- ☐ 3. Communicate with outside mainframe or mini through service bureau, database or time-sharing service
- ☐ 4. Local area network
- ☐ 5. Voice/data
- ☐ 6. None of the above
- ☐ 99. Other (please describe)

13. Are you involved in any of the areas shown below?

☐ Yes (check all that apply) ☐ No

☐ **A. Recommend** ☐ **B. Influence** ☐ **C. Specify** ☐ **D. Buy** (check all that define your involvement)

Software

- ☐ 1. spreadsheets
- ☐ 2. word processors/outline processors
- ☐ 3. database management
- ☐ 4. accounting
- ☐ 5. statistics
- ☐ 6. communications/networking
- ☐ 7. graphics
- ☐ 8. presentation
- ☐ 9. project management
- ☐ 10. desktop publishing
- ☐ 11. CAD/CAM
- ☐ 12. programming language
- ☐ 13. back-up systems
- ☐ 14. utilities
- ☐ 15. other _____

Peripherals

- ☐ 23. dot matrix printers
- ☐ 24. letter quality printers
- ☐ 25. plotter
- ☐ 26. laser printer
- ☐ 27. local area network
- ☐ 28. file server
- ☐ 29. optical disk
- ☐ 30. monochrome monitor
- ☐ 31. color monitor (standard)
- ☐ 32. hi-res color monitor
- ☐ 33. add-on board
- ☐ 34. external hard disk
- ☐ 35. internal hard disk
- ☐ 36. back-up systems
- ☐ 37. modem
- ☐ 38. other _____

Computers

- ☐ 16. personal computers
- ☐ 17. multiuser microcomputers
- ☐ 18. laptop microcomupters
- ☐ 19. portable microcomputers
- ☐ 20. engineering workstation
- ☐ 21. minicomputers
- ☐ 22. mainframe computers
- ☐ 23. others _____

Outside services

- ☐ 39. on-line services
- ☐ 40. education/training
- ☐ 41. maintenance
- ☐ 42. custom application
- ☐ 43. service bureau
- ☐ 44. other _____

14. Over the course of one year, how would you quantify your level of involvement in total microcomputer systems products?

☐ **A. Recommend** ☐ **B. Influence** ☐ **C. Specify** ☐ **D. Buy** (please check all that define your involvement)

- ☐ 1. less than $10,000
- ☐ 2. $10,000-$24,999
- ☐ 3. $25,000-$49,999
- ☐ 4. $50,000-$99,999
- ☐ 5. $100,000-$249,999
- ☐ 6. $250,000-$499,999
- ☐ 7. $500,000 +
- ☐ 8. None of the above

(check only one)



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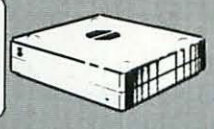
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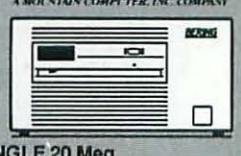
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MS-DOS for the Mac? Who cares. It's important to have the option, but who buys a Mac for DOS?

Contrast the evolution of IBM PCs and Apple's personal computers.

Apple puts thought into its machines' architecture organization and supports user options. I've been impressed by Apple's product development: the CPUs, architecture, color, memory expansion; Apple's future; the orderliness of the software's evolution. That means software design on the Mac can move more quickly. On the IBM PC side, there are all kinds of adapters and printers—no standards. Each application needs 5 or 6 screen adapter drivers and 20 or so printer drivers.

That sounds like an impressive difference to me, but what do IBM PC users think?

Apple should promote more to IBM PC users. Apple does nothing to convince them that the Mac II is more than a toy. Living Videotext may take out ads in IBM PC magazines to convince users to take the Mac seriously.

What did you think of the Appleworld show that launched the new Macs in March?

It was sort of an existentialist pep talk.

Overall I think Apple is not making enough of its technology. Today it does have a stronger machine than the others, including the DOS and PC compatibles, with no trade-offs. The Mac II is a milestone product, and there hasn't been enough drum beating about it.

In five years people will look back at the Mac II's announcement as a landmark. Apple calls the Mac II a platform, and that's an accurate description.

What is the reality of running three different operating systems on a Mac II?

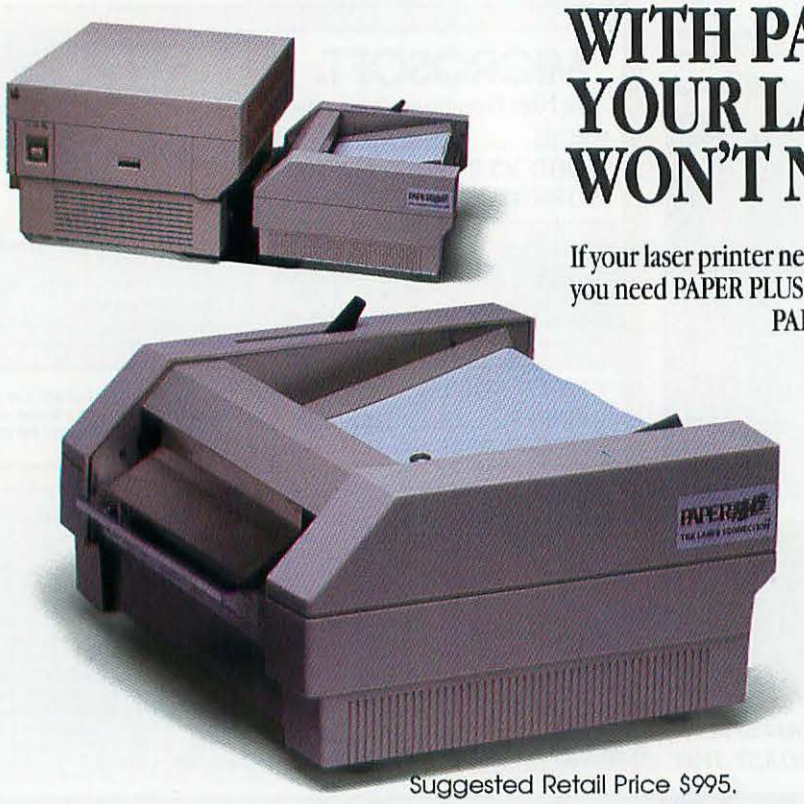
Well, the Apple choice for an operating system is clearly the Mac OS. Look at how much work Apple has put into the details of its operating system. Many personal computer developers shot from the hip in adding to the technology base, whereas Apple did a lot of thinking and planning.

MS-DOS for the Mac II? Who cares. It's important to have the option, but who buys a Mac for DOS? With all the compatibles, there are much less expensive alternatives for DOS. UNIX is different, since it takes the Mac into new markets.

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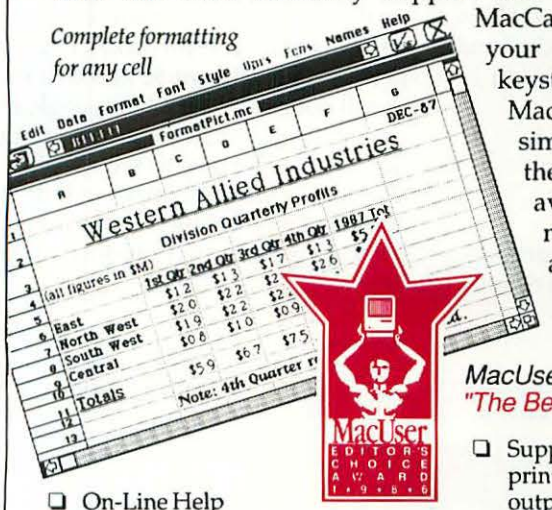
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If Apple loses control of the technology it will lose its strength in the market.

user groups for them to copy and try out, and we also put trial copies up on the CompuServe bulletin board. In fact, Living Videotext has its own forum on CompuServe where users go for information on our products.

How does that work?

We support a database and a bulletin board on CompuServe to answer questions. The turnaround is fast, maybe five to ten minutes for questions. Any way to talk to users helps you come down to earth.

What impact do Macintosh user groups have on the market?

They are less software product specific than PC user groups, and they have transformed the Macintosh. They pick up the slack on support that retailers cannot handle, and they help keep companies focused on their products.

I did a demo for the Mac user group in Chicago. A question came up about how to use *PageMaker* and *More* together. I really didn't know the best way, but someone in the audience stood up and explained how he used them together. Then another had a better way. I got a tutorial on my own product.

Does software piracy affect Living Videotext?

Theft can be a product of what users consider an unfair price. People see a manual and a disk and think that can't possibly be worth the list price; they don't see the investment in a product that costs $500,000 to develop, promote, and support.

We try to prevent casual theft by having our program ask for the user's name and organization. That information is encrypted onto the disk and shows up whenever it boots up. That gives the user a reason to withhold it from another person. People tell us that it helps because most want to do the right thing.

What do you think about software from the big companies?

Each company is different, but the big companies have more than just Mac products on the street. That diversification takes the risk out of launching a product. After all, a product that will cost $250,000 to $500,000 to roll out can be killed by a single reviewer who doesn't understand a product and doesn't take the time to see its value.

As a result you end up with predictable products–filling narrow niches and competing with other products–instead of diversity.

(continues)



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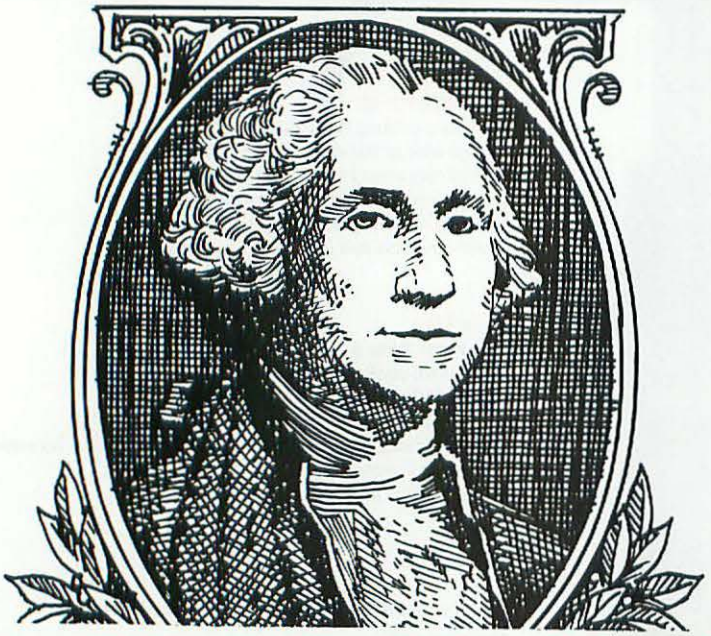
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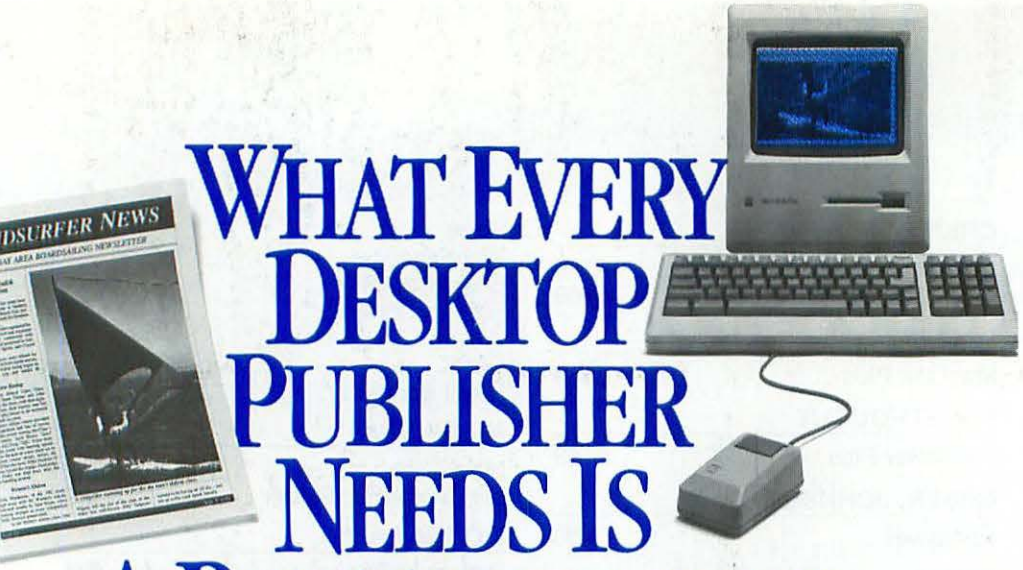
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Take *dBase Mac* for example. Its feature sets were very carefully selected, and the result is a formula product that doesn't appear to be very interesting.

Are Apple's products as exciting as they might be?

Well, the Mac SE is a necessary product, if not very exciting. It addresses the issues of compatibility on Macs and shows that the compact Mac still has a life. Apple's job is to be stable and predictable and to plan for the 1990s. Apple has to be conservative.

Its products are the ocean liner, and software companies are the crew. Apple directs the ship, but we help maneuver it.

If the system works, Apple hears us. If we're able to keep customers coming back or take Apple to a different place where there's a new group of customers, it'll listen.

Is there more progress on third-party software development now than under Jobs?

I think Jobs's vision of hardware was flawed, but not his vision of software. Look at the II; it has the same user interface we saw in 1984. It will be improved, but the basic philosophy has only evolved, not changed. Jobs misunderstood the needs of personal computer users; he was not attuned to the outside world. He denied that the IBM PC existed, and IBM succeeded when Apple had no leadership in the market. It took Gassée to realize that Apple had to push back the frontiers again. For example, in 1984 a 128K Mac with one 400K floppy drive was just not competitive.

Apple is rumored to be investing in key companies such as Forethought.

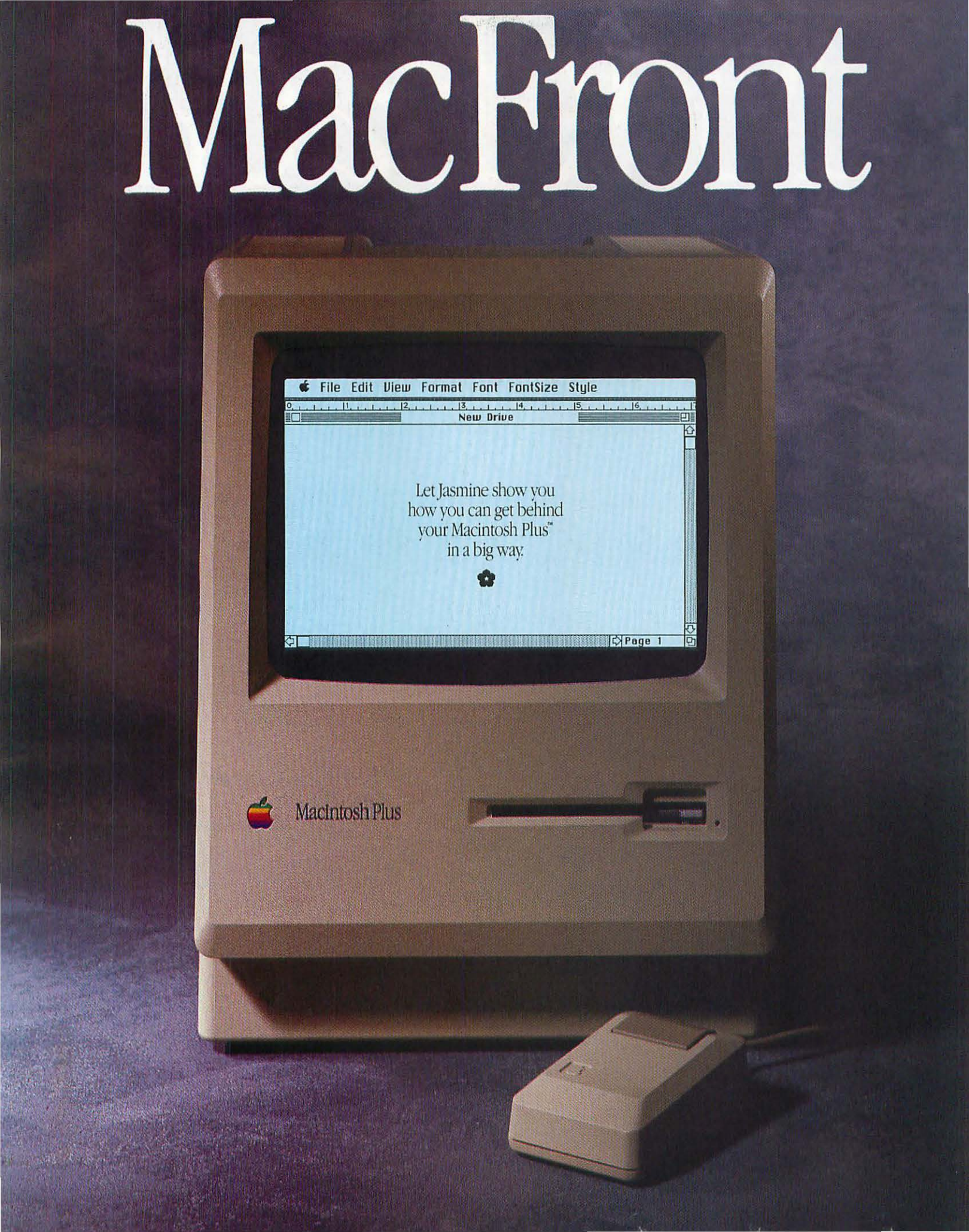
Apple needs strong allies. Software doesn't receive large venture investments, especially Mac software companies, so with carefully targeted investments Apple can help new markets get established. Apple doesn't want to be locked in exclusively with several large vendors that aren't loyal to Apple and that have more options than smaller companies.

Would Living Videotext accept an investment from Apple computer?

Sure, if it was the right sort of investment. □

Interviewed by Jerry Borrell

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Page 1
Macintosh Plus

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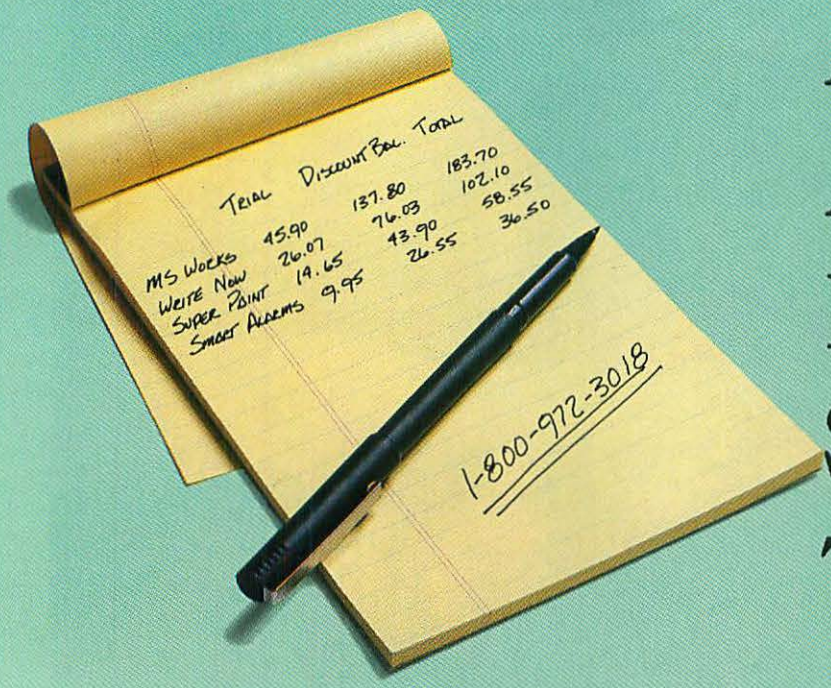
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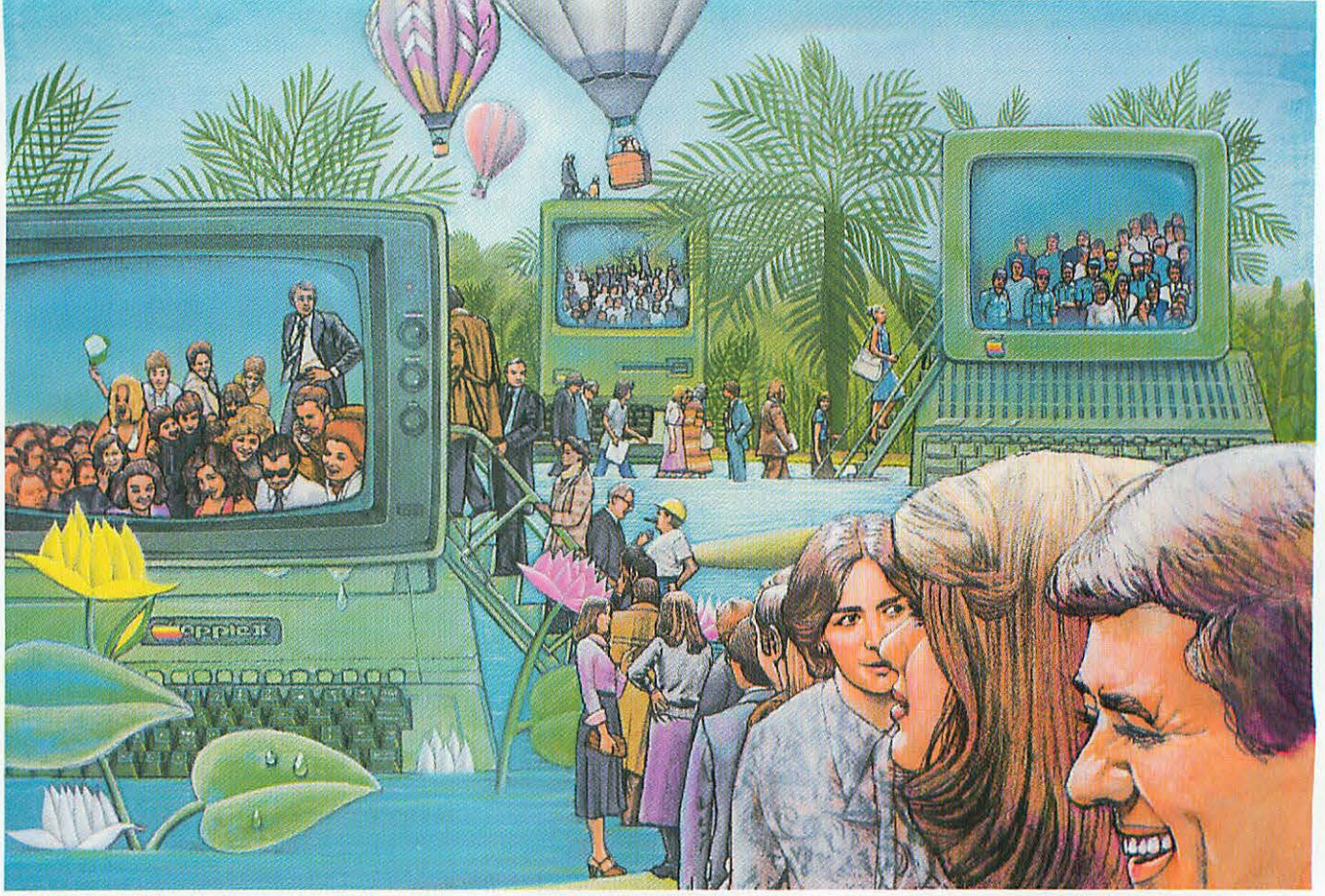
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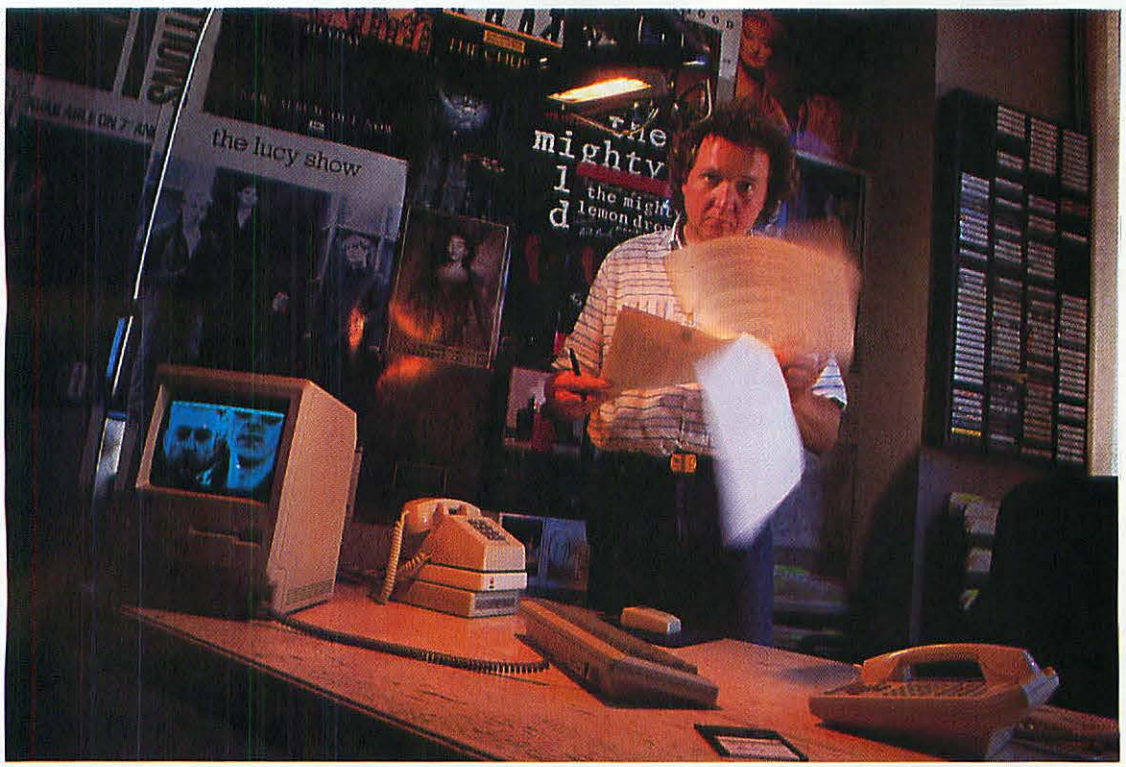
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Macworld News

by Daniel Farber



MAX AGUILERA-HELLWEG

David Snyder of Triad Artists streamlined staff communication with a multiuser* Omnis 3 Plus *program. Agents now spend their days with phones to their ears and hands on Mac keyboards.

Triad

Although David Snyder didn't know much about computers a few years ago, he saw the potential of using an Apple II to book concert tours and manage recording and performing artists. First, he designed a worksheet in *AppleWorks* and used it to set up and monitor a Tina Turner concert tour. Then Snyder and his associates at Triad Artists stepped up to the Mac. The agency—one of the largest in Los Angeles, with artists ranging from Julie Andrews to Ray Charles to Steve Winwood—uses the Macintosh with software that Snyder developed in *Omnis 3 Plus* to coordinate agents' work and to improve communication among the music, talent, literary, and packaging departments.

Snyder's program has over 400 fields, 30 data entry screens, and prints 100 different reports. A local area network—a Corvus Omninet with a 126-megabyte hard disk—enables each agent to work autonomously and to share information with others on the network.

Telecommunications is also part of Triad's system. Tour proposals are often sent via MCI Mail, and data from the *Omnis* database can be saved as a text file and used as a mailing list on MCI.

In a current project, an OCR reads in forms and contracts that weren't previously on disk, as well as glossy photos of clients. Meanwhile, Snyder is constantly modifying his program to provide even more exceptional client support.

Desk Accessory Parade

Desk accessories for the Macintosh range from calendars and sophisticated calculators to scaled-down versions of full-featured applications. Here are just a few that have become available from user groups and electronic bulletin boards in the last half year or so.

Artisto 1.4 (by Tom Taylor, contribution requested) displays any paint document either full size, or reduced to fit the window. *µPaint* (John Brehm, Roy Leban) is a miniature paint program, complete with a selection of patterns and line widths, a choice of fonts and font sizes, a line box and circle tools, an eraser, and a variety of ways for the pixels of overlapping objects to interact.

New Scrapbook (Tim Wasko, contribution requested) is an enhanced version of Apple's Scrapbook desk accessory. Unlike Apple's version, this program lets you retrieve selected lines of text or portions of images, and you can scroll to see text that is too long to fit in the window.

LaserWriter Reset 0.2 (Greg King) acts like a reset button for the LaserWriter. If your LaserWriter crashes because of a PostScript error, you can avoid having to turn the printer off and then on again by resetting it with this desk accessory. And with a PostScript spooler, you

(continues)

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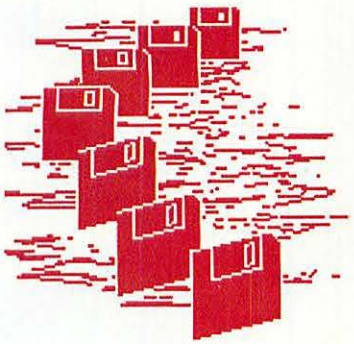
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can send a PostScript file directly to the LaserWriter for printing.

Saviour saves work in progress automatically at the first mouse click after a specified interval of time or number of keystrokes since the last save. It uses the save command of your choice: Save, Save As, or any special-purpose save commands your application may have.

LockOut 1.0 (Beyond) takes control of your Mac until someone types in the correct password, which you set beforehand. (Of course, it is possible to subvert *LockOut* simply by restarting the computer.)



To make life easier for those who have hard disks stuffed with folders and files, *Set Paths* 1.3 (Paul Snively, $20) lets users designate up to five different folders, and the paths needed to reach them, for the Mac to search each time an application looks for a program file. Such search paths are useful if you want to put all your help files, dictionaries, or downloadable fonts, for example, somewhere out of sight. The accompanying Init resource, Boot Paths, automatically reminds the Mac of the search paths each time you turn on your computer.

And for multiple-window programs that lack a Windows menu (the Finder included), there are two desk accessories that can provide them. One, *Wind[o]ws* spelled with an apple in place of the *o* (David Oster), creates a menu that lists open windows in alphabetical order only. The other, *Windows* (Marsh Gosnell, $5), lists windows in either alphabetical order or in the order in which they're layered, from front to back, on the screen.

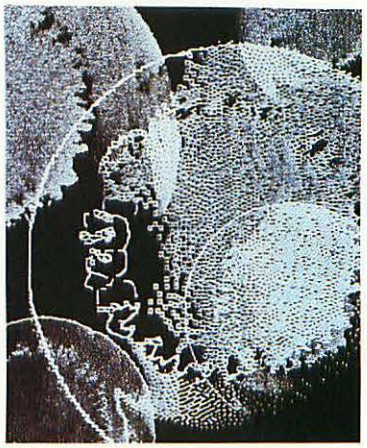
Nuclear Art

A single aerial photograph of an atom bomb provides the raw material for nine of Neelon Crawford's oil paintings. Crawford, a working artist for 20 years, is exploring the artistic possibilities of photographs taken in 1946 at the Bikini Island site used for atom-bomb experiments. With the Mac, a camera, and a darkroom, Crawford has produced hundreds of abstract variations of the images. He used a digitizer to transfer two-dimensional images of the explosion to the Mac for editing, and he created ImageWriter output that was photographed and then manipulated further in the darkroom. Finally, the developed images were transferred to canvas for the finished rendering.

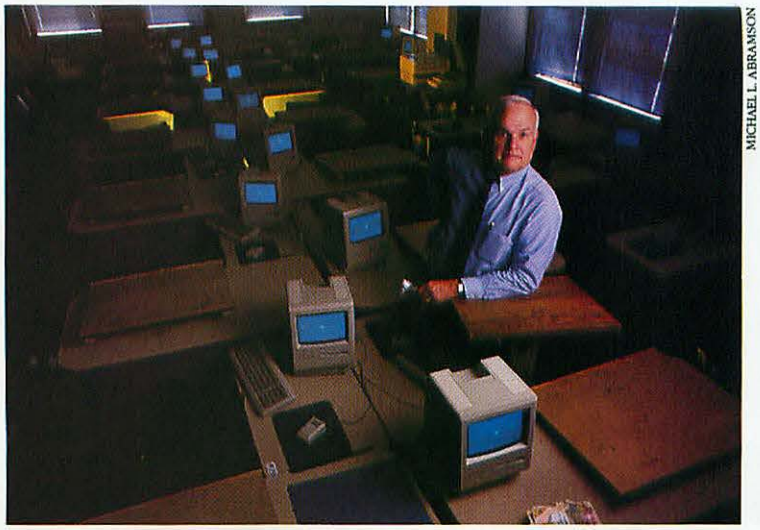
Crawford finds that the Mac's ability to let him work on several files at once aids the creative process. "The development of images in different dimensions at the same time leads to a cross-fertilization of the ideas involved," says Crawford. "Instead of one thing leading to another, the process becomes many things leading to many other things."

Crawford was introduced to the Mac while working on Hollywood movie production crews. What impresses him about the Mac is how it changes the way people think—it gives the average person license to experiment freely with text and graphics in ways that weren't possible or accessible before. —*Elinor Craig*





Artist Neelon Crawford used the Mac to help him transform images of atomic explosions into a statement about nuclear war.



MICHAEL L. ABRAMSON

Guy Tunnicliffe, chairman of the advertising department at the University of Missouri, is sold on desktop publishing.

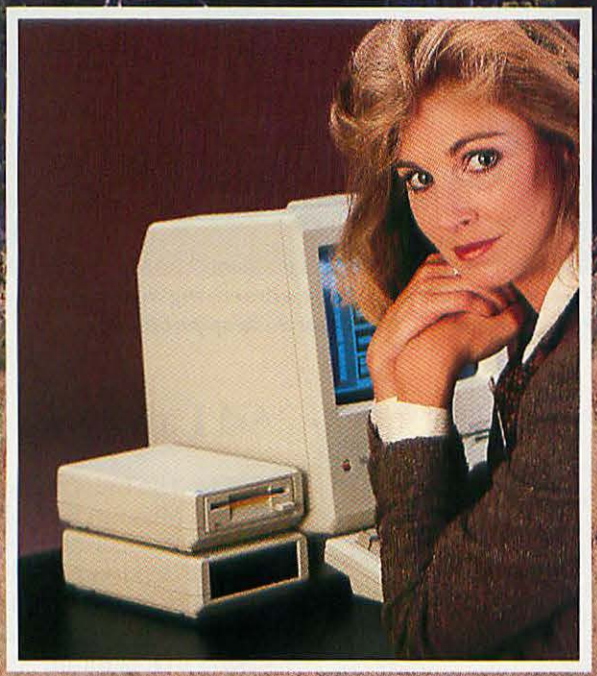
Ad Lab

The University of Missouri School of Journalism recently installed a desktop publishing laboratory with 25 Mac Pluses, 3 LaserWriters, and 5 ImageWriters so that future Madison Avenue magnates can learn desktop publishing on the Mac as part of their advertising curriculum. In addition, five faculty offices are equipped with Macs so instructors can access students' work, grade it, and return it—all electronically.

Desktop publishing equipment was deemed necessary since advertising students are training for a field in which combining text and graphics is a daily requirement.

Instead of stacks of clip art and mat books piled around the classroom, all the material is stored electronically. The students work with the basic Macintosh applications—*MacPaint, MacDraw,* and *MacWrite*—as well as page-layout software and clip art to create ads. The entire journalism school, which owns the local paper, the *Columbia Missourian,* benefits as well because the network is connected to the paper's pagination and typesetting equipment. —*Elinor Craig*

Power and Elegance

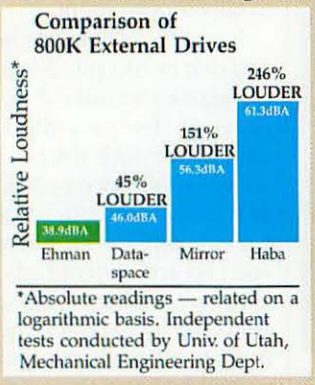


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Verbum

A quarterly magazine aimed at graphic designers who use personal computers recently published its first issue. *Verbum,* subtitled *A Journal of Personal Computer Aesthetics,* is attempting to bridge the gap between commerical and fine art. Inspired by existing high-quality graphic design magazines such as *Fine Print,* and by the Macintosh, the premier issue of *Verbum* includes a comparison of bit-mapped graphics programs, a review of *Fontographer,* and a PostScript tutorial. The heart of the magazine is the gallery of featured artists' work. The work showcased in *Verbum* often crosses over from commercial to fine art. That quality indicates editor Michael Gosney's interest in



MAX AGUILERA HELWEG

Verbum *focuses on the aesthetics of graphic design.*

putting an aesthetic spirit into what he calls "an overly technical genre."

The personal computer emphasis is on low-cost graphic arts systems like the Macintosh, rather than expensive color workstations, and includes both bit-mapped and vector graphics. Gosney feels that the bit-map look is going to have increasing impact on the design world and will never be completely replaced by PostScript high-resolution graphics.

Gosney and his staff use the Macintosh to design *Verbum.* The charter issue was done with *PageMaker* and the LaserWriter and includes some Linotronic output; future editions will use other page-layout programs. For more information contact *Verbum,* P.O. Box 15439, San Diego, CA 92115, 619/463-9977.

Earthquake Sleuths

With the help of the Macintosh, a team of researchers is rewriting the history of San Francisco's great 1906 earthquake. Using Telos's *Business Filevision,* the research team is collecting data on a block-by-block, address-by-address basis and storing information about the locations of the worst disasters, characteristics of the damage, and the number of deaths at each location. Digitized street maps of the city are stored on disk by quadrant so that damage patterns can be better visualized.

The reseachers have discovered that city officials downplayed the extent of the devastation caused by the temblor, attributing most of the destruction to the subsequent fires. Individuals who were insured against fire but not against earthquake aided in the cover-up, because they were anxious to get all they could out of the insurance companies. Although 498 has long been accepted as the earthquake's death toll, the research team now estimates that at least 2500 were killed.



DAN ESCOBAR

With the aid of the Mac, Richard Hansen and his mother, Gladys, are rewriting the history of the 1906 San Francisco earthquake.

The project is attracting national attention because of possible ramifications for prediction of earthquake damage. In addition, building-construction techniques and even emergency-response procedures may be altered once all the data is collected and analyzed.
—Elinor Craig

Inside Macintosh

Addison-Wesley is adding the final chapter to the Apple Technical Library *Inside Macintosh* collection with volume 5, scheduled for release this fall. It will cover changes for the Mac SE and the Mac II.

In addition, the *Inside Macintosh Library,* which will focus on specific topics for developers, will be published over the next year. The first offering will be *Technical Introduction to the Macintosh Family,* a language-independent discussion covering basic hardware and programming concepts for first-time Macintosh product developers.

The second *Inside Macintosh Library* title, *Macintosh Family Hardware Reference,* will cover hardware for all the Macs. The third book, tentatively titled *Macintosh II and Macintosh SE Cards and Drivers,* will focus on the Nubus and the SE expansion port. The fourth in the series, *Programmer's Introduction to the Macintosh,* will be similar to *Technical Introduction to the Macintosh Family* but heavier on programming concepts.

Another set of *Inside Macintosh Library* books is also in the works. These will provide about 2000 pages of documentation in three volumes: one on the Toolbox; one on System software; and one volume of summaries and indexes. The advantage of this recompilation of *Inside Macintosh* is that it

(continues)

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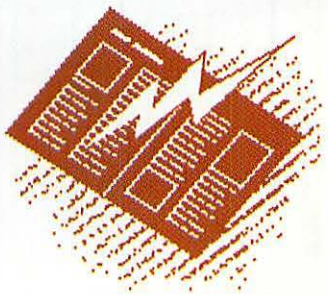
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organizes the information better, so readers waste less time thumbing through the volumes for cross-references.

Addison-Wesley will also release Scott Knaster's new book, which picks up where *How to Write Macintosh Software* (Hayden Books, 1986) left off. The new book includes information on new machines and should be out in the fall.

Electronic Art Service

Multi-Ad Services produces and distributes advertising art to more than 50 percent of U.S. daily newspapers and over 1500 other publications. The artwork used to be delivered in mammoth books, with each image displayed in several sizes. Now however, Multi-Ad's new Inhouse Graphic Services (IGS) is taking advantage of the Macintosh and PostScript to provide a sophisticated electronic art-and-layout service.



Subscribers receive over 900 pieces of generic art each year on CD ROM, plus brand-name product art from manufacturers such as General Foods and Coca Cola. All artwork is in vector form (like *MacDraw* and Adobe's *Illustrator*), which requires less storage space, provides cleaner output than bit-mapped graphics (like *MacPaint*) on PostScript-driven printers, and has the ability to scale images.

IGS's page-layout software, a customized version of Quark's *XPress,* includes a full-featured word processor with a spelling checker, autohyphenation, kerning, and horizontal text scaling. Layout features include automatic text flow, text runaround, and the ability to superimpose text and graphics.

In addition, a subscription includes software updates and a monthly newsletter. IGS also provides a customized artwork service, which can, for example, create retail logos for customers with *Illustrator.* An IGS subscription costs $200 a month, plus $25 for each Macintosh workstation.

Multi-Ad is also using the Mac in its Retail Cooperative Advertising Service, currently used by 350 newspapers to stimulate retail advertising. The system at each newspaper consists of a Mac with hard disk, modem, and printer. Also included is a *Helix* database with product checklists that help determine what eligible products retailers carry, complete advertiser histories, accrual tracking, co-op policies for over 20,000 manufacturers, and several report formats (including billing and manufacturer claims). If someone requests data on a product not on the list, Multi-Ad does the research, and if a plan exists, it goes into the next update of the database.

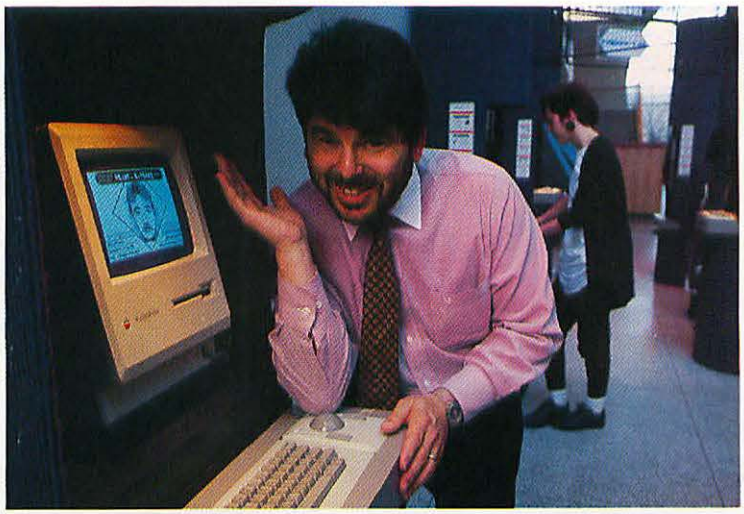
Besides distributing ad art, Multi-Ad is involved in creating product illustrations—over 90 percent of the food products manufactured and advertised in the United States are now illustrated by Multi-Ad artists with the aid of the Macintosh.

ComputerCade

Michael Sand, who heads a Boston museum-planning and media-development firm, has been incorporating the Macintosh into museum exhibits across the country. At the Museum of Science in Boston, for example, Sand created a coin-operated arcade to make people comfortable with the Mac by allowing visitors to play with several programs. The ComputerCade is controlled by special software; people can design faces using *Mac a Mug,* play or compose music with *Studio Session,* play a round of racquetball with *Smash Hit Racquetball,* or have *Arsmagna* find all the anagrams for their name.

At Commonwealth Museum at the Massachusetts State Archives Building, the Mac is used as a historical time line—a visual database containing information about presidents, geography, the Constitution, population, and so on. You scroll along the time line and click on a year; buttons appear for the four topics, and clicking one of them displays the appropriate information. As in a hypertext system, clicking again displays another layer of information. To keep the interface simple, people who use the Mac at the exhibit don't have to deal with the keyboard—the Turbo Touch trackball is the only input device.

Sand has also installed Macs at the National Boy Scout Museum in Murray, Kentucky. A special version of *Filemaker Plus* enables people to enter comments about their visit to the museum. Sand wants to ultimately see printers coupled to the Macs, so people can take away souvenirs of their museum experience.



SETH RESNICK

Michael Sand's firm has devised unique ways of employing Macintoshes as part of interactive museum exhibits.

Apple Comes to Washington

The Apple Federal Government Operation in Reston, Virginia, with a sales and marketing staff of 50, represents the company's long-term commitment to penetrating the biggest market of them all in nearby Washington, D.C.

According to Frank Sauer, hired two years ago to evaluate the feasibility of the government market and now head of Apple government sales and marketing, "Prior to 1985, Apple did not concentrate on any portion of government markets because of the phenomenal growth in educational and consumer markets."

Although there is some dispute over the General Services Administration's claim that Apple now holds 6 percent of the government microcomputer

(continues)

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September 30, 1986



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ERIC POGGENPOHL

Ron Oklewicz and Frank Sauer are leading Apple's effort to attract government sales.

market, unquestionably Apple is working toward being a major player in that arena. Right now, the company is focusing on the $4 billion of long-term government microcomputer procurements that will be signed over the next two years.

Although federal bureaucrats use the Mac for every imaginable office application, Apple is focusing on third-party software solutions such as graphic briefing documents, electronic visual presentations, facilities management, logistics modeling, and thought processors. Apple is also confident that the new open-architecture systems can offer the friendly Mac interface as an attractive link to the government's large installed base of mainframe systems.

Company officials allude to large impending government purchases that are expected to open the floodgates for the Macintosh and to challenge the de facto MS-DOS standard in many federal agencies. "We support the formation of standards to serve the end user, not some arbitrary technical specifications," says Ron Oklewicz, head of Apple's Washington sales force. "Design specs can be written into a particular contract, but they should define functional performance, not a specific operating system," he adds.

Toward these ends, Apple has instituted a government third-party consortium to coordinate efforts with developers and system integrators interested in the government market. New products are demonstrated to a growing government constituency at a quarter-million-dollar executive briefing center in Reston that features rear-screen projection displays, light shows, and interactive media exhibits. In the same building, separate company groups are increasing Apple's presence in federal government activities by participating in public-policy debates, gathering intelligence on trade issues, and developing strategies for emerging industry standards.

Oklewicz points out that "the real heroes are the government Mac users who started things rolling by bringing their own machines to work, and who are taking an active role in spreading the word."—*Stuart Silverstone*

The Missing Mac



Most people who have seen the Macintosh II agree that the open machine is a new branch on the Macintosh evolutionary tree and that it will carry the machine into the 1990s. Also laying claim to a unique place on that tree is the Macintosh SE, an offshoot of the original Macintosh that grew from seeds planted at Xerox PARC. But some people believe that there's still a missing link between the SE and the II—a small, screenless Mac with the SE digital and logic boards, a disk drive, and an ATB keyboard. As with the Mac SE, you would plug boards into a single slot to hook up large screens, hard disks, and other peripherals. In fact, such a machine would be a good foundation for a truly portable Mac. Of course the absence of a screenless Mac may be based on marketing realities rather than engineering realities. Third-party hardware developers would wholeheartedly approve, since they could sell a lot of screens and hard disks to support such a machine, but Apple probably doesn't want to crowd the territory that the Mac II is starting to carve out for itself.

The Mac Teaches Speech



Howard Schlieper is an audio systems engineer in the communications department of the Model Secondary School for the Deaf. The school, on the campus of Gallaudet College in Washington, D.C., was created by Congress as a model school for educating people with impaired hearing. The communications department includes speech pathology, audiology, and music.

The sound lab in Schlieper's office has a raised vibrating floor for feeling the sound and devices that make sound "visual"—an organ that represents frequencies by different colors and a stereo speaker with a mirror that reflects a laser beam in time to the music. In addition, Schlieper uses oscilloscopes and spectrum analyzers to generate scientific pictures of sound.

Most of the students have impaired speech abilities along with hearing impairments. Last year, Schlieper purchased an Emulator sampler, a Macintosh, and Digidesign's *Sound Designer* software, believing that the fast representation of speech with *Sound Designer* could be a powerful tool for speech pathology. In fact, it turned out to be so powerful that the students now advance at nearly ten times the rate they were able to achieve before.

The teachers' words are sampled (digitally recorded) and these files are transferred to the Macintosh with *Sound Designer*. This software provides a visual overview of the amplitude envelope of the sound, as well as a spectrum analysis. Students can analyze a word or syllable with *Sound Designer* and then sample their own voices pronouncing the same word.

The audiologists in the lab use the system to increase stu-

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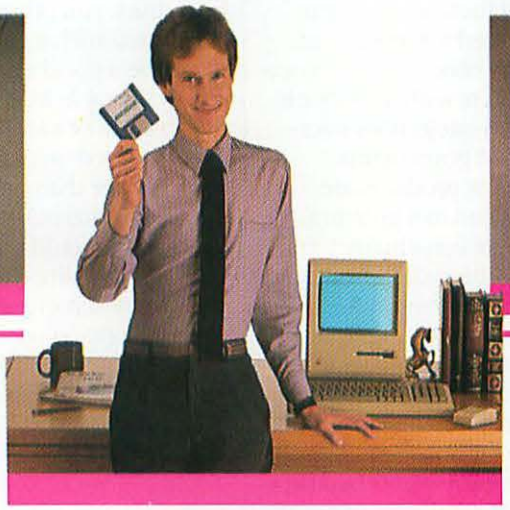
ERIC POGGENPOHL

The Mac and Digidesign's* Sound Designer *are used for speech therapy at the Model Secondary School for the Deaf.

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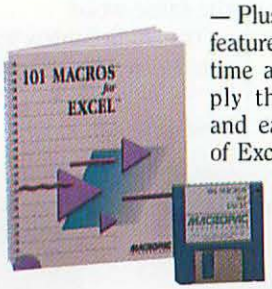
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dents' listening skills. To this end, Schlieper has sampled many everyday sounds, such as dogs barking and car engines starting. He assigns various sounds to keys on the Emulator keyboard so that students can play one after the other and compare their acoustical properties in *Sound Designer*.

Schlieper reports that speech pathologists don't have the best reputation with hearing-impaired adolescents. Parental pressure to learn speech is sometimes interpreted by the students as a weekly hassle that they have endured for as long as they can remember. But with Schlieper's high-tech tools, it's hard to keep the students away from the sound lab. Together the Macintosh and the Emulator sampler have generated so much student interest at the Model Secondary School for the Deaf that Schlieper is now teaching a course in computer music.—*Christopher Yavelow*

Einstein Meets Macintosh

What really happens to time and space when you travel close to the speed of light? Einstein couldn't see time fly, so he described his theory of special relativity in long, complex formulae. Students enrolled in Physics 60 at Stanford University can see time fly by launching their Macintoshes.

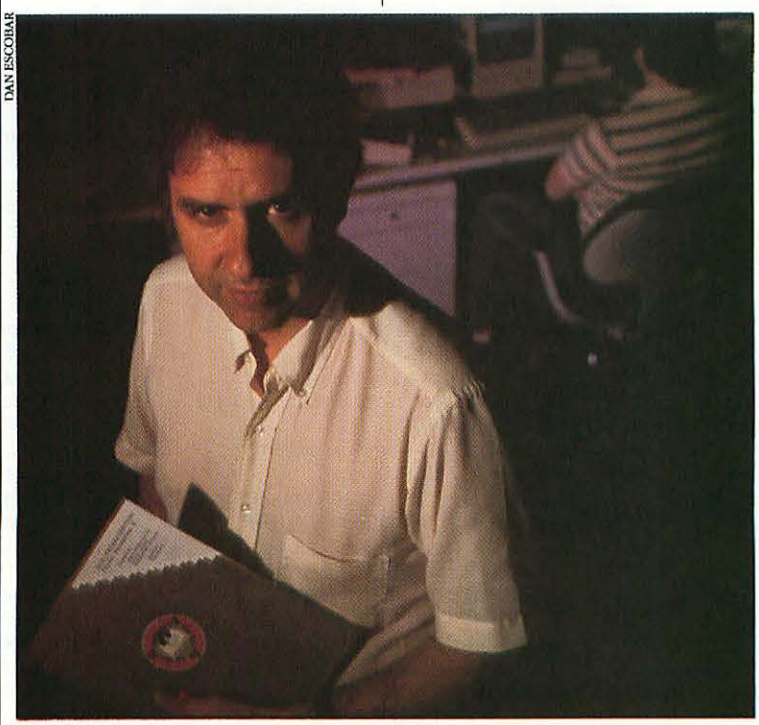
With a Macintosh, Professor Blas Cabrera provides computer simulations for his Advanced Introduction to Physics class. The Macintosh is the first affordable computer with sufficient power to render smooth animations for classroom use. Along with James Terman and Sha Xin Wei, two student programmers from Stanford's Faculty Author Development (FAD) program, Professor Cabrera has written 16 simulations to cover a full year of physics (mechanics, electromagnetism, and modern physics). The visualizations of difficult concepts help the teacher to explain and the student to understand the dynamic systems of the physical universe.

Each week a new simulation is introduced and demonstrated in class on a Macintosh equipped with a large video display. There are simulations that demonstrate Einstein's special relativity, Kepler's planetary motion, the oscillatory motion of electric radiation, Fourier transforms, elementary kinetic theory, and a model superconductor. Students are assigned problem sets that use the simulations to find the answers. The simulations provide a method for checking both analytical and intuitive results. About half of the 20 students in the class have Macintoshes; the remainder have access to Macintosh clusters at the libraries on campus. Students spend about two hours a week with the simulations, getting hands-on experience and developing an intuitive understanding that wasn't possible before.

The programming was started in the fall of 1985, and the manual was finished in time for this academic year. Cabrera wrote all of the computational algorithms in *Microsoft BASIC* and then turned them over to the FAD programmers for fine tuning and enhancement. They used *Lisa Pascal* to add speed, graphics, controls, and a consistent user interface.

Two of the project's goals were that computer literacy not be a prerequisite and that the Macintosh's graphic capabilities be used to provide maximum scope with minimum complexity. The simulations are applicable to all of the introductory physics courses, from physics for engineers to physics for poets. Thanks to Professor Cabrera, it no longer takes an Einstein to think in four dimensions. It just takes a Mac.—*Clay Andres*

DAN ESCOBAR



At Stanford University, Blas Cabrera teaches physics students with assistance from computer simulations designed on the Mac.



CRAY RESEARCH, INC.

Seymour Cray's Mac helps him design multimillion-dollar supercomputers.

Apple Uses Cray, Cray Uses Mac

When Seymour Cray, developer of the Cray supercomputer, heard that Apple Computer had bought a Cray to work on new product design, he revealed that he'd just started using a Mac to help design the Cray III. Cray is said to prefer the most simple, easy-to-use tools available so that he can spend time working rather than learning to use the tools.

Cray uses his Mac to commit to words and drawings his concepts and configurations for the new Cray system. Whereas the Cray II is ten times faster than the original model, a design objective of the new system is to be ten times faster than the Cray II. Gallium arsenide circuits are expected to contribute their remarkable electrical conductivity and low heat properties to the new design.

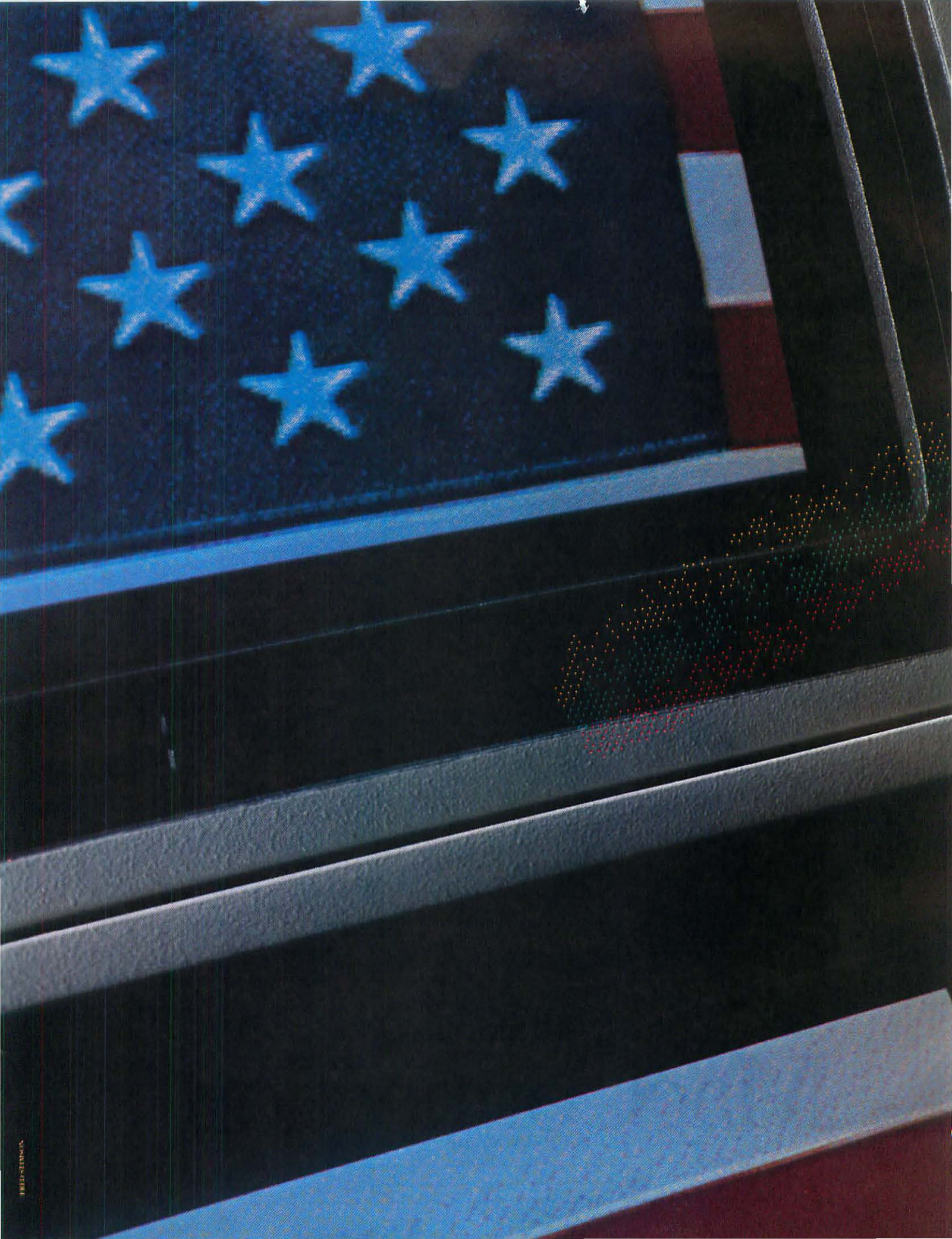
Besides using the Mac, the reclusive Cray improves his creativity by eschewing interviews and by working unpredictable hours in his Chippewa Falls, Wisconsin, research labs and cottage-in-the-woods.
—*Stuart Silverstone* □

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SoftStyle ... NCP
Colormate Art *(Colormate images)* 27.
Colormate *(color printing utility)* 48.
Printworks *(print faster & in color)* 49.
Laserstart *(Hewlett-Packard Laserjet)* 58.
Decision Map *(make better decisions, CP)* 75.
Softview ... NCP
Macinuse *(time-use manager)* 35.
Software Discoveries ... NCP
Record Holder *(data manager)* 41.
Software Ventures ... NCP
Microphone *(communications)* 58.
Solutions, Inc. ... NCP
SmartScrap & The Clipper 41.
Glue *(creates "print to disk" capability)* . . . 41.
Springboard ... CP
Art a la Mac Vol. 1-People & Places *(NCP)* 23.
Art a la Mac Vol. 2-Variety Pack *(NCP)* 23.
Easy as ABC (ages 3-6, letters, CP) 28.
Early Games *(ages 2-6, counting, CP)* 28.
Certificate Maker *(CP)* 35.
State of the Art ... CP
Electric Checkbook *(print checks)* 28.
SuperMac Technology ... NCP
SuperSpool 39.
Diskfit *(backup & restore utility)* 49.
SuperLaserSpool 99.
Multi-User SuperLaserSpool 259.
Survivor Software ... NCP
MacMoney *(financial planner)* 42.
Symmetry ... NCP
Acta 1.2 *(outline/writing desk accessory)* . . 38.
PictureBase 1.2 *(clip art manager, 512k)* . . 44.
T/Maker ... NCP
ClickArt Personal Graphics 28.
ClickArt Effects 28.
ClickArt Publications 28.
ClickArt Letters Vol. 1 or Vol. 2 28.
ClickArt Holidays *(Easter)* 28.
ClickArt Business Image 28.
Bombay, Plymouth, or Seville Laser font . . . 46.

MacConnection Special of the Month
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FORETHOUGHT
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Think Educational ... CP
MacEdge II or Mind Over Mac 28.
Think Technologies ... NCP
Laserspeed *(Laserwriter utility)* 67.
Lightspeed Pascal *(includes debugger)* . . . 87.
Lightspeed C *(top-rated C Compiler)* 127.
TML Systems ... NCP
TML Source Code Library 58.
TML Database Toolkit 64.
TML Pascal *(compiler, req. 512k)* 68.
TrueBasic ... NCP
True BASIC *(fast, flexible & portable)* 59.
Algebra II, Pre-calculus, Calculus, Trigonometry, 3D Graphics, Discrete Math, Probability & Chippendale utilities . . . *each* 35.
TrueSTAT *(statistics)* 58.
Runtime *(create stand-alone applications)* 59.
Unicorn ... CP
Animal Kingdom *(ages 6-12)* 27.
Decimal Dungeon *(math, ages 9 and up)* . . 27.
Fraction Action *(arcade style math game)* 27.
Mac Robots *(pre-school program)* 27.
Math Wizard *(math games, ages 5-10)* 27.
Read-A-Rama *(reading, ages 5-8)* 32.
William & Macias ... NCP
myDiskLabeler *(design & print labels)* 24.
myDiskLabeler w/Color *(req. Imagewriter II)* 33.
myDiskLabeler w/Laserwriter option $35.
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Tass Times in Tonetown 27.
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Hacker II *(breach Russian computer)* 30.
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MacPro Football *(req. 512k)* 30.
Blue Chip ... CP
Millionaire *(stock market)* 35.
Tycoon *(commodities)* 35.
Baron *(real estate)* 35.
Squire *(personal finance, req. 512k)* 35.
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Lode Runner *(over 150 levels)* 24.
Ancient Art of War *(military strategy)* 27.
Toy Shop *(create working models)* 39.
Bullseye ... CP
Ferrari Grand Prix *(Formula One racing)* . . . 34.
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Electronic Arts ... CP
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Seven Cities of Gold 27.
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Patton-vs-Rommel *(req. 512k)* 27.
Pinball Construction Set 27.
Chessmaster 2000 30.
Epyx ... CP
Sub Battle Simulator 24.
Winter Games *(Olympic events)* 24.
Rogue *(strategy dungeon classic!)* 24.
Hayden Software ... CP
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Sargon III *(9 levels of chess)* 29.
Infinity Software ... CP
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Infocom ... CP
Leather Goddesses of Phobos
Hitchhiker's Guide, Trinity, Moonmist, Ballyhoo, Bureaucracy *(standard)* . . . *each* 24.
Zork Trilogy 45.

1-800/Mac&Lisa 720C

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you.

MacroMind ... NCP
Maze Wars+ *(play via modem or network)* $32.
Miles Computing ... CP
Harrier Strike Mission *(3D flight simulation)* 27.
MacWars *(3D space simulation)* 27.
Mindscape ... CP
Racter *(converse with your Mac!)* 27.
Balance of Power *(world politics)* 30.
King of Chicago *(req. minimum 512E)* 30.
Brataccus *(great graphics, req. 512k)* 30.
Uninvited *(mystery adventure)* 30.
Deja Vu *(murder mystery)* 32.
PBI Software ... CP
Strategic Conquest *(multi-user)* 35.
Psion ... CP
Psion Chess *(3D and multi-lingual)* 31.
QWare ... CP
Orb Quest *(graphic fantasy adventure)* 29.
Rainbird ... CP
Pawn *(fantasy adventure)* 27.
Sierra On-Line ... CP
Championship Boxing *(knock 'em out!)* 25.
Silicon Beach Software
Airborne! *(CP, the classic!)* 20.
Enchanted Scepters *(CP, over 200 scenes)* 21.
Dark Castle *(NCP, arcade action)* 28.
World Builder *(NCP, program creator)* 41.
Simon & Schuster ... CP
Star Trek—The Kobayashi Adventure 24.
Sir-Tech ... CP
Mac Wizardry *(high-rated fantasy)* 35.
SPHERE, INC. ... NCP
GATO *(submarine simulation)* 26.
Orbiter *(space shuttle simulation)* 27.
Tellstar II *(No. & So. hemispheres, req. 512k)* 32.
XOR ... NCP
NFL Challenge *(be the coach!)* 79.

HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

Apricorn ... 1 year
ApriCord Mac *(for your Mac 512k)* 75.
ApriCord Mac *(Mac Plus parallel interface)* 75.
AST Research ... 2 years
AST 2000 *(20 MB, 20 MB tape)* 1695.
Curtis Manufacturing ... lifetime
Diamond *(6 outlets)* 29.
Emerald *(6 outlets; 6 ft cord)* 36.
Sapphire *(3 outlets; EMI/RFI filtered)* 47.
Ruby *(6 outlets; EMI/RFI filtered; 6 ft cord)* 55.
Dove Computer ... 90 days
SCSI Interface Port 125.
MacSnap Memory Upgrades
Mac Snap 524 *(512k to 1 Meg)* 139.
Mac Snap 524S *(incl. SCSI interface)* 239.
Mac Snap Plus 2 *(Mac Plus to 2 Meg)* 249.
Mac Snap 548 *(512k to 2 Meg)* 369.
Mac Snap 548S *(incl. SCSI interface)* 499.
Ergotron ... 1 year
Mouse Cleaner 360° 15.
MacTilt *(includes external drive bracket)* 74.
MacBuffer 512k 329.
MacBuffer 1024k 429.
Hayes ... 2 years
Smartcom II *(communications software)* 88.
Smartmodem 1200 $369.
Smartmodem 1200 Package 425.
Smartmodem 2400 569.
InterBridge *(connect Appletalk networks)* 599.
IOMEGA ... 90 days
Bernoulli Box *(dual 10 MB w/SCSI)* 1579.
Bernoulli Box *(dual 20 MB w/SCSI)* 1879.
Bernoulli Box *(dual 10 MB, Appletalk)* 1995.
Kensington ... 1 year
Appletalk Cable Clips or Connectors *each* 1.
Mouseway *(mouse tracking pad)* 8.
Mouse Pocket *(for your idle mouse)* 8.
Mac Plus/Mac SE System Saver Cover 9.
Imagewriter (II) Dust Cover 9.
Mouse Cleaning Kit w/Mouse Pocket 17.
Disk Case *(holds 36 Mac disks)* 19.
Disk Drive Cleaning Kit 20.
Tilt/Swivel 22.
Universal Copy Stand 24.
Polarizing Filter *(Mac Plus or Mac SE)* 34.
Surge Suppressor 34.
Printer Muffler *(80 column)* 39.
Control Center 64.
System Saver Mac *(platinum or beige)* 64.
A-B Box *(for the Mac Plus)* 65.
Turbo Mouse 85.
Koala Technologies ... 90 days
MacVision *(digitizer)* 175.
Kraft ... 1 year
3 Button QuickStick 49.
Mirror Technologies ... 1 year
Magnum 800 External Drive 229.
MagNet 20x *(w/cable & backup utilities)* 779.
Magnum 20 Tape Backup 899.
MagNet 30x *(w/cable & print spoolers)* 949.
MagNet 40x *(w/cable & print spoolers)* 1299.
MagNet 40/40 *(40MB, 40MB tape)* 2395.
MagNet 85x *(w/40MB tape)* 3995.
Personal Computer Peripherals ... 1 year
MacBottom Hard Drive 20MB *(serial)* 865.
MacBottom Hard Drive 20MB *(SCSI)* 865.
MacBottom Hard Drive 45MB *(SCSI)* 1295.
SoftStyle ... 90 days
MacEnhancer *(for plotters to printers)* 179.
Summagraphics ... 90 days
MacTablet 6" x 9" *(stylus driven)* 289.
MacTablet 12" x 12" *(sketching)* 379.
Systems Control ... 2 years
MacGard *(surge protection)* 55.
Thunderware ... 90 days
Thunderscan *(high-resolution digitizer)* 175.
Powerport 29.
Western Automation ... 1 year
DASCH RAMdisk 2000k 459.

DISKS

Single-sided Diskettes

Sony 3½" Disks *(box of 10)* 14.
MAXELL 3½" Disks *(box of 10)* 14.
Fuji 3½" Disks *(box of 10)* 14.
Verbatim 3½" Disks *(box of 10)* 15.
3M 3½" Disks *(box of 10)* 16.

Double-sided Diskettes

Sony 3½" Disks *(box of 10)* 21
MAXELL 3½" Disks *(box of 10)* 21.
Fuji 3½" Disks *(box of 10)* 21.
Verbatim 3½" Disks *(box of 10)* 23.
3M 3½" Disks *(box of 10)* 24.

INFORMATION SERVICES

Compuserve
Compuserve Information Service $24.
Dow Jones
Dow Jones News/Retrieval Membership Kit 24.

ACCESSORIES

Clean Image Ribbon Co.
Clean Image Ribbon Kit 12.
Computer Coverup
Imagewriter (II) Cover 8.
Mac (Plus) & Keyboard *(two covers)* 10.
Diversions
Underware Ribbon *(iron-on black transfer)* 9.
Multi-color Transfer Ribbon 19.
I/O Design
Imageware II *(Imagewriter II carry case)* 49.
Macinware Plus *(Mac Plus carry case)* 69.
Macinware SE *(Mac SE carry case)* 89.
Innovative Concepts
Flip & File Micro *(holds 25 disks)* 9.
Flip & File *(holds 40 disks)* 18.
Innovative Technologies
The Pocket Pak *(holds 6 disks)* 9.
The Easel *(holds 20 disks)* 13.
The Disk Directory *(holds 32 disks)* 18.
The Library *(carousel, holds 80 disks)* 29.
Kalmar Designs
Teakwood Roll-top Case *(holds 45 disks)* 14.
Teakwood Roll-top Case *(holds 90 disks)* 21.
Teakwood Roll-top Case *(holds 135 disks)* 29.
Magnum
Mouse Mover *(let your mouse ride!)* 14.
Moustrak
Moustrak Pad *(standard 7" x 9")* 8.
Moustrak Pad *(large 9" x 11")* 9.
Smith & Bellows
Mahogany Disk Case *(holds 90 disks)* 28.

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Winner.
And still a champion.

Dear MacPeople,

My name is Martha Finch and I am 25. Three years ago, I was in a serious running accident. I was jogging in Aspen, Colorado up a mountain road and a motorcycle was coming down the same road and hit me badly. I was in the hospital for an entire year with head injuries and broken bones in both of my arms and both legs. My progress is very slow. Today I can't even walk and can barely talk.

Before my accident I was very athletic. I was a national swimmer in college. I also qualified for the Boston Marathon in 3 hours and 17 minutes. Now I have to switch from all my physical capabilities to only mental activities, and the Mac really helps me. The Mac has enabled me to express myself in letters to my friends. I write all my letters with "MacWrite" and make my own cards with "Print Shop". I am also in the process of writing a book about my experiences.

Mac is a saving grace for me. It is a very good friend.

Sincerely,
Martha Finch



Despite an accident which confined her to a wheelchair, Martha Finch is overflowing with creativity. All with a little help from her Mac.

Contest Winner #8

Name: Martha Finch

System: Mac 512

Applications: Writing, card design, and all around companionship.

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Chasing Rainbows

In which I tire of waiting and go in search of Mac II displays



by David Ushijima

It was the antithesis of a childhood Christmas, when counting days was almost as exciting as tearing open packages. As this article went to press, the SE's big brother was reportedly about two months away from being delivered to retail stores. While waiting for a machine, I paid a visit to the designers of the first display products, hoping to learn more about the Mac II and discuss what they felt were the issues in video cards and displays. I started at Apple. Its video card and 12-inch monochrome and 13-inch color monitors would, by virtue of the Apple label, be the standard against which all other display add-ons would be compared. Toby Farrand, Dave Fung, Ernie Beernink, and Art Cabral of Apple

quickly raised my video consciousness with an invigorating tutorial on the Apple video card and color software. Steve Edelman of SuperMac and David Le and Don Pannell of Sigma Designs were equally enthusiastic, showing me monitors that displayed as dazzling an array of dots on the screen as any you'd find on a Sun or Apollo workstation.

The Chunkiness of Color

The first step in clearing up video confusion is to realize that the on-screen image is controlled by the video card and is also heavily influenced by the characteristics of the monitor. Because the monitors and video cards will likely be offered together, the differences in each component's capabilities may become blurred in the manufacturer's ads. However, if you're willing to persevere, I'll attempt to unravel what happens at each end of the video cable.

The model of screen graphics, as exemplified by Apple's current video card, is based on what's called a *chunky* or *packed-pixel* architecture. Basically, the image you see on the Mac II's screen is stored in an area of very fast memory, called the *frame buffer,* on the Mac II's video card. Each picture element (pixel) on the screen is represented by a series of bits, 1 if the image is black-and-white, 2, 4, or 8 bits if the image is displayed in color or shades of gray. Each pixel's color information is packed together in chunks in the video memory and stored sequentially, beginning with the top-left and ending with the bottom-right pixel. Currently the Apple video card, SuperMac's Grafix and Spectrum cards, Sigma Designs' LaserView, E-Machines' Big Picture for the Mac II, and Micrographic Images' MegaScreen follow Apple's chunky color model. Even the current crop of video cards for the PC (CGA, EGA, PGA, and the new MCGA and VGA) use the packed model.

ED KASHI



Behind the Screens
The designers responsible for Apple's video card and ROM color software (clockwise from top): Toby Farrand, David Fung, Ernie Beernink, Art Cabral, and Amy Goldsmith.

The alternative to chunky architecture is *planar* architecture (see "Chunky versus Planar"), in which the screen image is physically organized into a number of bit planes, each stored in a separate area of memory (see "The Graphic Mac," *Macworld,* November 1986). While the packed-pixel architecture is suited for displaying a single color image, boards designed around the planar architecture are often better suited for image-processing applications, such as those requiring the manipulation of multiple image layers on screen. At present, National Semiconductor is the only vendor to have announced a video card for the Mac II that uses the planar architecture. National's board, based on its recently released Advanced Graphics Chip Set (AGCS), will reportedly be able to display up to 32 bit planes.

Pixel Wars

With the exception of National Semiconductor's board, all current Mac II video systems (here *video system* will refer to both the card and the monitor) implement the frame buffer in much the same way, differing primarily in the number of dots displayed horizontally and vertically, and in the number of colors that can be displayed on the screen simultaneously.

As you search for a display system, the term *resolution* will pop up frequently. Resolution is used in two ways; the first is a measure of the number of pixels displayed on a screen. For example, Apple's video card and monitor can display up to 640 pixels horizontally and 480 pixels vertically, whereas SuperMac's Spectrum can display up to 1024 by 768. In the black-and-white arena, Sigma Designs' LaserView displays 1664 by 1200, SuperMac's Graphix up to 1365 by 1024, E-Machines' Big Picture 1024 by 808, and Micrographic Images' MegaScreen up to 1024 by 900. Jasmine has also announced a black-and-white card that will display 1024 by 1024 pixels. Resolution in this context depends on the frame buffer size (determined by the amount of video RAM on the card) and on how many dots the monitor can display on screen.

The second use of the term resolution refers to pixel density, the number of dots per inch displayed by the monitor. This figure is dependent upon the monitor's size and the number of dots displayed (more on this later).

Since a black-and-white display only requires 1 bit per pixel—the pixel is either *on* or it is *off* (1 or 0)—a 640-by-480-pixel monochrome card contains slightly more than 38K of video RAM (640 × 480 bits). On the other hand, a black-and-white monitor with high resolution, like Sigma Designs' LaserView, contains about 250K (1664 × 1200 bits).

Spheres of a Different Color

The best way to compare monitors—to determine how they differ in resolution, size, and color—is to run them side by side.

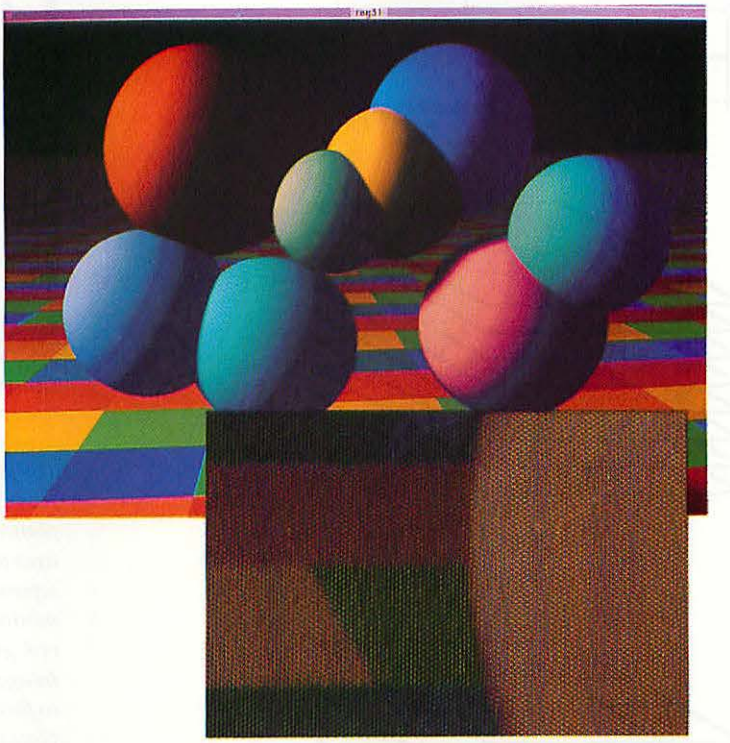
For my comparisons, I set up Apple's 13-inch color monitor next to SuperMac's 19-inch screen. The monitors were driven by their respective video cards. Using the Monitor settings in the Control Panel, I configured both cards to display 256 colors—8 bits of color information per pixel.

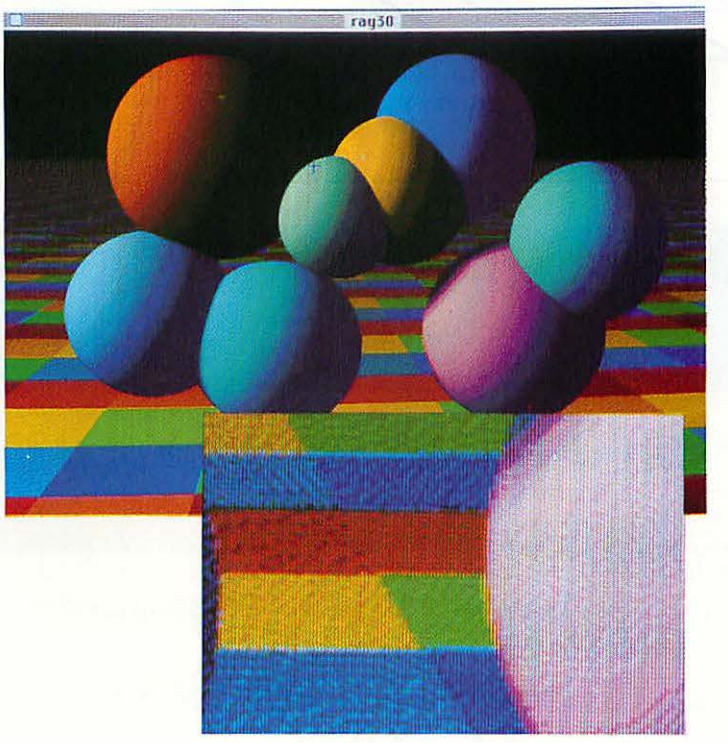
Differences in screens were immediately apparent, as the accompanying photos show. (Keep in mind that the screens shown here reflect film characteristics and the color printing process used to print the magazine.)

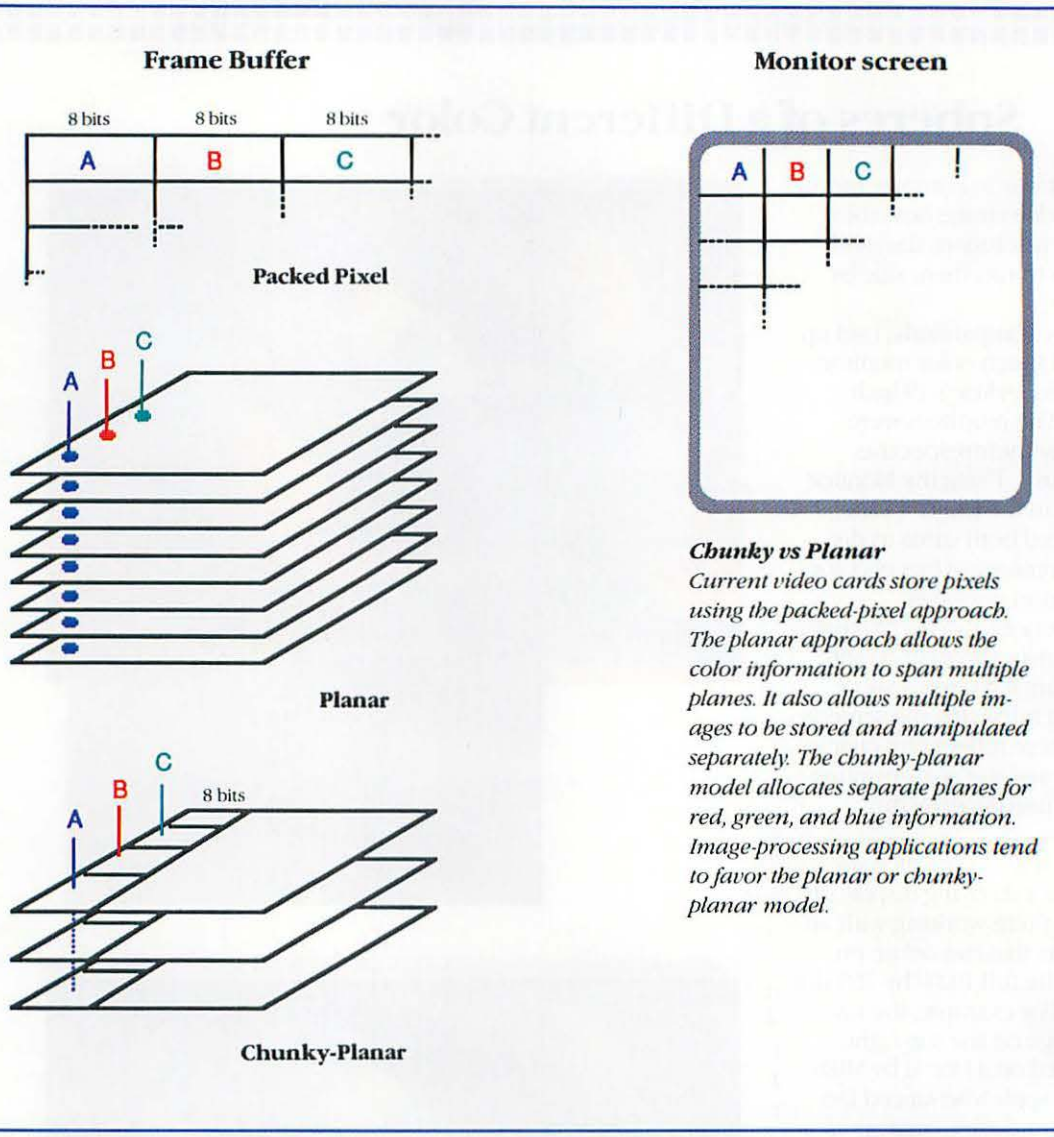
SuperMac's color monitor gives you a dazzling display of color if you're working with applications that can create images in the full 1024- by 768-dot display. For example, the raycast image on the top right, processed on a Mac II by Mike Potel of Apple's Advanced Development Group, consists of over 786,000 dots and fills the entire SuperMac screen.

On the other hand, the equivalent full-screen image displayed on the Apple color monitor (shown on the bottom right) consists of fewer than half that number of dots.

In general, the images on Apple's monitors were sharper, the edges of objects were much more clearly defined, and the colors were brighter and truer. Much of this superiority may be credited to the Sony-manufactured monitor—Sony's Trinitron uses vertical red, green, and blue bands and a finer shadow mask than SuperMac's monitor.







Chunky vs Planar

Current video cards store pixels using the packed-pixel approach. The planar approach allows the color information to span multiple planes. It also allows multiple images to be stored and manipulated separately. The chunky-planar model allocates separate planes for red, green, and blue information. Image-processing applications tend to favor the planar or chunky-planar model.

Rainbows Compared

Manufacturer	Resolution	Color/Mono	Bits per Pixel	Monitor Size (in inches)	Dots per Inch (dpi)	Horizontal Scan Rate
Apple	640 by 480	mono	up to 8	12	76	35 kHz
SuperMac	1365 by 1024[1]	mono	1	19	72	64 kHz
Sigma Designs	1664 by 1200	mono	1	15/19	150/110	75 kHz
E-Machines	1024 by 808	mono	1	17	82	50.5 kHz
Micrographic Images	1024 by 900	mono	1	19.5	72	54 kHz
Apple	640 by 480	color	up to 8	13	69	35 kHz
SuperMac	1024 by 768[5]	color	up to 8	19	72	64 kHz

[1] 1280 by 1024 (66.67-Hz refresh rate).
[2] E-Machines will be unbundling board and monitor.
[3] 60 Hz at 1024 by 850.
[4] 68881 available for an additional $349.
[5] User can also display 640.

On a color video board, the size of the frame buffer affects how many colors or shades of gray are displayed on screen at a time: for simultaneous display of 256 colors or gray shades, 8 bits are required for each pixel. Therefore, to display 640 by 480 pixels in 256 colors, as Apple's card does, the video card must contain slightly over 307K of video RAM (640 × 480 × 8 bits).

Color video cards usually come with a minimum amount of video RAM; you can add chips later to display more pixels and/or more colors on the screen at once. Apple offers its card with one bank of video RAM, so you can display 640 by 480 pixels in 16 on-screen colors. Adding another bank lets you display the same number of pixels in 256 on-screen colors. SuperMac, on the other hand, offers its Spectrum board in three configurations. The minimal Spectrum displays 1024 by 768 pixels in black and white. Adding a second bank lets the Spectrum display 640 by 480 or 800 by 600 pixels in up to 256 on-screen colors, or 1024 by 768 pixels in up to 16 on-screen colors. Adding the final bank of video RAM lets you display 1024- by 768-pixel images in up to 256 colors.

More dots on the screen generally means that you see more—either a larger page or several pages of text or graphics at once. It doesn't mean that images are displayed in any more detail or with any more dots than on a lower-resolution screen. For example, if you display a circle on a 640-by-480 screen and compare it to the same circle on a higher-resolution display, the circle would be drawn with the same number of dots on both screens. What would affect the image sharpness or the smoothness of the circle would be the size and other characteristics of the monitor.

Increasing the number of colors on the screen can do more for realism than can simply adding more dots. For example, a color television has fairly low resolution, but because it isn't limited to displaying a fixed set of colors—the red, green, and blue guns are controlled by an analog signal—the resulting picture looks realistic.

Refresh Rate	Dot Pitch	Price
66.67 Hz	n/a	$399 monitor/$499 card
60 Hz[1]	n/a	$1495 monitor/$495 card
60 Hz	n/a	$1795/$2295
60 Hz	n/a	$1995[2]
58 Hz[3]	n/a	$1995[4]
66.67 Hz	.26mm	$999 monitor/$499 card,
		$199 expansion kit
60 Hz[5]	.26mm/.31mm	$2995 monitor/$749 b/w
		card/$1495 color card

From Numbers to Colors

To transform the color information stored in the video RAM into a colored dot on the screen, designers currently employ a mechanism called a *color lookup table.* The color information stored in the video RAM for each pixel is an 8-bit binary number, specifying one of up to 256 colors. Both the Apple color video card and SuperMac's Spectrum use the 8-bit number to index a table of colors called the color lookup table. The table contains 256 entries; each entry is a 24-bit number that can represent one of 2^{24}, or over 16 million colors. The output of the color table feeds three 8-bit digital-to-analog converters, which translate the 24-bit number into three analog signals that control the monitor's red, green, and blue electron guns, resulting in a colored dot on the screen (see "The Graphic Mac," *Macworld,* November 1986).

Because both the Apple and the SuperMac color cards contain color tables with only 256 entries, neither card can display more than 256 colors on screen at a time. However, the color table entries can be changed during the blanking interval that occurs between successive screen displays. In fact, it is the Palette Manager, a recent addition to the Mac II's system software, that is responsible for allowing application programs to modify the color table entries in order to create color animations and other image sequences that require more than 256 colors on screen (see "Changing Palettes").

Dots that Glow in the Night

While the video card controls the screen image, it is the monitor you actually see. The right monitor can mean the difference between a sharp, crisp, very realistic image and a blurred or fuzzy one. So when choosing a monitor, you should consider a number of properties.

A black-and-white monitor's screen is coated with minuscule dots of phosphor, which are spaced evenly over the screen's surface and emit light when hit with a stream of electrons. An image is created by turning a beam on and off while scanning it across the face of the screen, much as you would read a page of text from left to right and from top to bottom.

The rate at which the electron beam scans lines is called the *horizontal scan rate.* A monitor's scan rate is usually specified in kilohertz (kHz). For example, Apple's 13-inch color monitor has a horizontal scan rate of 35 kHz—it can scan 35,000 lines per second. The higher the scan rate, the more lines can be displayed on the screen.

Vital Statistics

Comparing monitor specifications won't tell you the whole story. For the complete picture you need to compare the appearance of both text and graphics on the screens.

Have you ever noticed a Mac screen from the other side of a room? Often it will appear to flicker, whereas at close range it looks stable. By turning your head so that you see the screen in your peripheral field of vision, you'll notice the flicker even more. Screen flicker is influenced by the *vertical refresh rate,* the rate at which the beam repaints the entire screen.

Having more dots doesn't mean you can see objects on the screen more easily.

The Mac repaints the screen using *noninterlaced refreshing:* the entire screen is refreshed at once. The alternative, the interlaced method, refreshes a portion of the screen, every other line, on the first pass, then goes back and repaints the alternate set of lines on the second pass. If it's done quickly enough, you don't notice the flicker.

As a rule, refresh rates of 60 Hz and above on a noninterlaced screen (repainting the entire screen about 60 times a second) result in a flicker-free display. Apple's color monitor and SuperMac's Spectrum in its 640-by-480 color mode have a refresh rate of 66.67 Hz, so the screen appears rock solid.

A third measure of a monitor's performance is *dot clock rate,* often referred to as the monitor's bandwidth. The dot clock rate specifies the rate at which the monitor can accept the pixel data from the video card, and ultimately how quickly the pixels can be turned on and off.

One of the most basic monitor specifications is the size of the screen viewing area. Monitors are usually measured diagonally across the face of the screen. The number of pixels spread across the viewing area yields a pixel density given in dots per inch. Given the same number of dots, a smaller screen would result in a higher number of dots displayed per inch, so the image would appear much denser on the smaller screen. For example, Sigma offers two sizes of monitors, 19-inch and 15-inch, with its video card. The 19-inch monitor displays 110 dots per inch; the 15-inch monitor displays 150 dots per inch. Both display the same total number of dots on the screen.

Having more dots on the screen doesn't necessarily mean you can see objects on the screen more easily. A lot of dots on a small screen results in tiny images. On Sigma's 15-inch monitor, the cursor and the Trash Can are not easily discernible on screen—you really have to look to see them. Sigma recognizes the problem and is working on a desk accessory that will let you increase the size of objects on the screen. This is similar to what Radius does with its Full Page Display for the Mac Plus and the SE, although the Radius FPD changes only the proportions of the cursor and menu bar items.

Coloring Images

To display an image in color, a color monitor replaces the single pixels of a black-and-white screen with a pixel triad—one red, green, and blue element per triad. Each element in the triad responds to the coinciding gun—red, green, or blue—of the color monitor. By varying the intensities of red, green, and blue, the monitor can display a particular color.

Color monitors use what is called a *shadow mask,* or *aperture grill,* a metal mask placed between the electron guns and the screen with openings for each screen pixel. The spacing between openings in the shadow mask is called its *pitch.* The finer the pitch, the sharper the image. Apple's 13-inch color monitor, manufactured by Sony, uses an aperture grill with a pitch of .26mm, resulting in an extremely sharp image. The dot pitch for most color monitors in the same class averages about .31mm.

One key to obtaining a distortion-free image is the match between a monitor's dot clock rate and the spacing between pixels. The closer the pixels are spaced, the more dots can fit horizontally across the screen, and therefore the faster the dot clock rate must be in order to turn on each pixel in synchrony. Attempting to feed a fast video signal into a monitor with inadequate dot pitch results in distortions such as moiré patterns.

A test of a color monitor's quality is its ability to display both black-and-white and color images with the same sharpness. For example, the desktop displayed on Apple's color monitor looks almost identical to the desktop on Apple's black-and-white monitor—a sign of a high-quality color display.

The criteria for selecting a color monitor are largely subjective because of the differences in the ways people perceive color. Some additional factors that influence the quality of a color monitor are the brightness or *luminance level* of the individual pixels, the shape of the pixels, and the color characteristics of the phosphors used.

To Mix and Match?

One last issue. Most of the display manufacturers bundle their video cards with their own color monitors. Many have worked with the monitor manufacturers to come up with a design tailored to a particular video card. You can't just go out and buy any color monitor and plug it into the card you have. The interface between the monitor and video card will determine whether you can physically connect the two. Many of the black-and-white video cards send digital signals to the monitor conforming to particular voltage levels, referred to as *TTL levels.* Sigma's LaserView and E-Machines' Big Picture, however, are exceptions, sending their signals in the form of ECL signals, a much faster interface method that uses much lower voltage levels.

Color video cards normally send their signals to the monitor in the form of analog voltages to each of

Changing Palettes

While 256 colors may seem like a lot to display simultaneously on screen, when you look out a window, whatever you see most certainly contains many times that number. Depending on your screen image, 256 may be excessive or may not even be enough. For example, writers and spreadsheet users would rarely need more than a few colors—perhaps some shades of color or gray for color fonts—but graphic artists working with digitized color photos could require far more colors than the Mac II's palette provides. A gray scale of 256 shades can provide a smooth gradient from white to black. But when you consider the display of a computer-generated image containing hundreds or even thousands of shades, or try to represent an object as realistically as possible, a palette of 256 colors falls short of the mark.

Apple's engineers realized that applications relying heavily on color would require a standard way to change the colors in the palette, so they created the Palette Manager.

Applications specify a color using a 48-bit number, actually composed of three 16-bit values, for shades of red, green, and blue. An application calls the Color Manager to get the closest approximation to the actual 48-bit color specified in the program. The Color Manager knows how to use the color lookup table on any video card you plug into the Mac II.

The Mac II's system software treats a video card's color table as a shared resource, falling under the control of the Palette Manager. Two running applications could share the same color palette, for example, or two windows on the desktop might require two separate sets of colors. An even more complex case occurs when you have two screens—each with its own palette definition—and a single window spanning the two screens. The Palette Manager handles all three cases by keeping track of many different palettes and screens.

To create animations requiring more than 256 colors, the Palette Manager lets an application change a subset of colors on the fly. Colors can be classified in three groups: those requiring only a satisfactory match, those requiring a match within certain tolerances, and those requiring an exact match. For colors that must be represented exactly, the Palette Manager can write an RGB color number directly into the color table. In this way, an animation could actually simulate many times the 256-color limit imposed by the current offering of color cards.

the three guns (red, green, and blue). Monitors that accept these signals are referred to as analog RGB monitors. Gray-scale monitors like Apple's 12-inch monochrome monitors also require an analog input.

Apple worked with Sony to come up with its 13-inch color monitor. By attaching an off-the-shelf RGB monitor with a wider dot pitch than that of Apple's, you can end up with an intelligible but somewhat distorted image. However, Sony does offer its own 13-inch Multiscan CPD-1390, which a few developers report works well with the Apple color card. Likewise, SuperMac's 19-inch monitor is manufactured by Hitachi, and it's used on workstations like the Iris from Silicon Graphics. You can't buy that monitor off the shelf yet, but as the Mac II gains popularity, and as the prices of high-resolution color monitors drop, it won't be long before it's available.

Shopping for Rainbows

While this all may have sounded a bit technical, really the only way to pick a monitor is to go out and compare them side-by-side, something I plan to do as soon as I get my Mac II.

Let your eye be the final judge. After all, you're the one who's going to be staring at the screen for hours on end. Just as you can characterize the sound of a stereo system as warm, tinny, brittle, brilliant, full, and so forth, so can you characterize your video as sharp, fuzzy, warm, bright, or hot. Choosing a monitor is really a subjective call.

And don't forget that the marketplace is changing rapidly. As I was finishing this piece, several manufacturers, including Radius, E-Machines, and Jasmine, were about to announce new color cards for the Mac II, making window-shopping even more exciting, but all the more confusing.

Armed with the knowledge of how color works on the Mac II, you're at least prepared to go out and ask some intelligent questions. And after that, let your eyes do the rest. □

See *Where to Buy* for product details.



In order (counter-clockwise): Abaton's C-Scan 300, New Image Technologies' MacScan, the Dest PC Scan Plus, and the AST TurboScan.

Scanning the Horizon

by David Foster

A survey of the current scene in high-resolution image digitizers

Digitizing scanners that work at the LaserWriter's 300-dot-per-inch resolution may be a desktop publisher's or computer artist's dream, but at the moment they're also a shopper's nightmare. In the last year, approximately a dozen high-resolution scanners have been released or announced. While the hardware for many of these units is fairly straightforward, the controlling software packages present a tangled web of choices for the prospective scanner owner. Not only do they offer very different features and pursue different basic approaches to the problem of making digital halftones, but most of these programs are still undergoing development, with features being added or revised on a regular basis. Further complicating matters is the manufacturers' inability to settle on a standard format for high-resolution graphics (see "The Tiff over TIFF").

The six scanners reviewed here are the ones that were actually shipping when we prepared this article. All the control programs except ThunderScan's (which was a beta copy, yet the most polished in some ways) were release versions. On the other hand, almost all the manufacturers said they were expecting upgrades. So if you're worried about a particular shortcoming, compare the version number of the program reviewed here with the one you see in stores; the program may have improved.

Before You Buy

A good grasp of the current state of affairs in the digitizing world will help you evaluate specific models. One of the first issues you should consider is memory. Since most scanners save data to RAM rather than to disk, the maximum area you can scan is limited by the amount of memory remaining after your operating system and scanning application have been loaded. All the scanners reviewed here need at least one megabyte to capture a half-page graphic effectively at 300 dots per inch (dpi). A 512K Mac can handle only about 25 square inches.

High-resolution images also eat up a lot of storage space. You'll need at least one 800K floppy disk drive to save your digitized images. Since a double-sided disk may hold only one or two scan files, a fast SCSI hard disk drive is highly recommended.

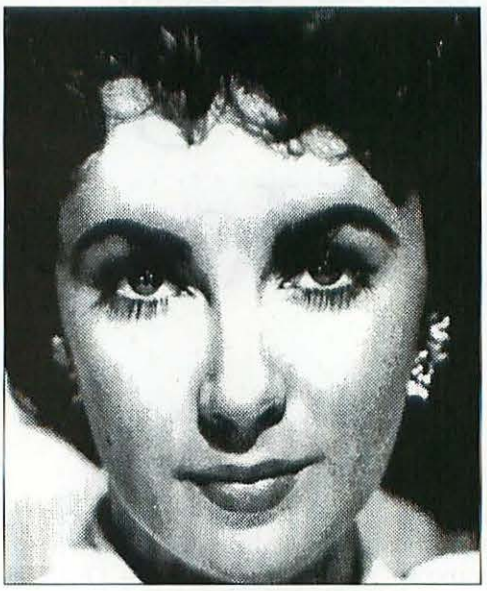
Once you're sure you've got enough memory, it's time to consider the kind of scanner you want. Scanners come in two flavors: sheet-fed and flatbed. The optical reader in sheet-fed scanners remains stationary as the artwork moves past it. Flatbed scanners work more like photocopiers, with the optical reader moving across the artwork. All the scanners reviewed here are of the sheet-fed variety.

The major consideration in deciding whether a flatbed configuration merits the extra cost is whether you plan on using artwork, such as prints bound into a book, which can't easily be fed between rollers. Of course, you can always make photocopies of your originals and then scan those. Doing so enables you to size before you digitize, which yields better results than sizing in software. And while you're considering paper-handling mechanisms, be sure to look for basic quality. The Microtek unit (used also by AST and Abaton) is the sturdiest of the assemblies I looked at, while the MacScan struck me as the flimsiest. If you plan on using a scanner in a professional environment, you'll want to consider the superior speed of units that attach to the Mac through the SCSI port versus those that attach through the serial port. As expected, SCSI-based scanners are twice as fast.

One final consideration is that some scanners have the ability to work with both images and text. Optical Character Recognition (OCR) software enables a digitizer to translate printed text into an ASCII file accessible from any word processor, outliner, or database program. When this article was prepared, only the Dest scanner offered OCR. Abaton says it has an optional OCR program ready for distribution. Known as *ACR* (Abaton Character Recognition), the software will cost $700 to new

PHOTOGRAPHS BY FRED STIMSON





No Hereford Jokes, Please

Due to the limited brightness and contrast controls offered by the software for PC Scan Plus (left) and MacScan, the unattractive highlights on Liz's cheeks and forehead were unavoidable.

purchasers of the C-Scan 300 and will sell for $995 as an upgrade. Be aware that most OCR programs are limited in their ability to recognize different typefaces and complex formatting.

PC Scan Plus

The Dest PC Scan Plus is a sleek, single-piece unit that fits underneath the Macintosh. Despite this scanner's high price, it doesn't come ready to be attached to the Mac's SCSI connector; you have to buy SCSI cables. Although Dest's installation guide shows how to connect the PC Scan once you have the right cables, two relatively experienced colleagues of mine had difficulty connecting the PC Scan to their Macintoshes. If you're confused about SCSI ID conflicts and when and where SCSI terminators are required, I recommend that you have a competent technician or consultant set up this system for you the first time.

In addition to scanning photographs, shaded drawings, and line art, the PC Scan Plus works as an optical character reader. Making a scan is as simple as inserting originals or photocopies into a slot located in the front of the unit. You must insert pages carefully, since the paper guide is a bit too short to ensure that pages go in perfectly straight. The PC Scan accepts paper sizes from 3½ by 3½ inches to 8½ by 14 inches, and it handles an amazingly wide range of thicknesses and color shades.

Dest's Publish Pac program (version 1.0) is easy to use. You needn't spend any time learning to adjust parameters for controlling halftone patterns or brightness, because these features aren't adjustable; only the contrast of an image can be altered. Publish Pac offers scanning resolutions of 200, 240, or 300 dpi, but the program saves only 300-dpi scans in an easily edited form. Images can be converted into high-contrast bit maps or into halftones.

Publish Pac provides no way to edit a scanned image; your only option is to save it in one of three formats: TIFF (Tag Image File Format), a format pioneered by Aldus, which is likely to become a desktop publishing standard; *PageMaker* format, for loading images into versions of *PageMaker* preceding version 2.0; and *SuperPaint*'s LaserBits format.

If you want to edit your Dest scan, you must save the image in LaserBits and make your changes in *SuperPaint,* which comes with the PC Scan. I discovered several severe limitations to this approach. First, an 8- by 10-inch image is the largest you can import into *SuperPaint.* Second, when you save a large image, it gets broken up. An 8- by 10-inch picture, for example, multiplies into 16 separate documents. Going into so many separate documents to edit a graphic can be extremely frustrating, particularly if your change spans several blocks. Third, if you use HFS you must keep all the documents in the folder in which they were created, or *SuperPaint* can't find them when you open the master graphic document. Finally, whenever I printed large graphics saved in this format, thin white lines separated each 2- by 2½-inch block, forming an unappealing grid pattern on the LaserWriter output. To make matters worse, the printer was very slow. Some of these problems may be resolved by the time you read this, but until they are, I cannot recommend the Dest scanner.

Using Publish Pac to create *MacWrite* documents from scanned text is surprisingly fast and error-free—when it works. I found that the PC Scan read most text documents created with a typewriter, a letter-quality daisy wheel printer, or even a dot matrix printer quite well. Surprisingly, the software does not recognize most LaserWriter fonts—with the exception of Courier. Text from magazines, books, and newspapers almost always proved unacceptable for scanning. If you need to transform typewritten text into *MacWrite* documents, however, Publish Pac's OCR capability could be a godsend. The program does a creditable job of preserving paragraphs, columns, tabs, centers, indents, and underlines. You'll need to make a few changes every now and then, but on the whole, this scanner performs capable and reasonably fast optical character recognition.

MacScan

MacScan from New Image Technologies includes a Princeton Graphics LS 300 Page Scanner, a hardware-based SCSI interface, and New Image's MacScan software. Despite some flaws, this package was my favorite of the group. Connected to the Mac via a special SCSI interface box (powered by a ColecoVision power supply), the LS 300 scanner consistently provided high-quality images. This scanner's only major problem is that it feeds images through the machine via small rollers that are located in the center of the paper path, which makes scanning small paper sizes difficult.

MacScan digitizes line art and continuous-tone images at resolutions of 75, 150, 200, or 300 dpi. The software gives you only three brightness settings. These are usually sufficient, but a little more control over brightness, as well as some halftone options, would provide a lot more flexibility. MacScan offers seven magnification lev-

The Tiff over TIFF

Once an image has been scanned, the next step is often to either put it into a graphics program for editing or other purposes or to move it directly to a place where it will be useful, such as a page-layout program. Two standard formats have been created to allow high-resolution graphics to be moved back and forth between applications: EPS (Encapsulated PostScript) and TIFF (Tag Image File Format). The market has yet to decide which standard will prevail.

At present, most scanner packages can output TIFF, and some would argue that TIFF may ultimately emerge as the standard, due to acceptance by Microsoft, Aldus, and others. As of this writing, *PageMaker* 2.0 will definitely support TIFF, and *Scoop* will probably end up working with TIFF. *PageMaker,* however, will also support EPS, as does Quark's *XPress. ReadySetGo* currently supports only standard PostScript and can accept files only as large as 32K (whereas scanned images can easily run to 1 megabyte).

In the graphics software arena, EPS seems to be the favorite. *Cricket Draw* outputs EPS, but won't open EPS files created by another program (it will display the EPS code in an editing window.) Adobe's *Illustrator* outputs EPS (for Macintosh and for Microsoft's *Windows* environments), but it also won't open an EPS file created by another program. Neither program will open TIFF files. *GraphicWorks* 1.1 enables you to open TIFF files and edit them; given this, it might just surpass *SuperPaint* as the standard low-end scanned-image editor.

Sound confusing? It will probably be a while before the Mac market stabilizes in terms of PostScript/scanned image standards. Predictably, as the Mac grows into more advanced capabilities, Mac owners are beginning to get a taste of what the average IBM PC owner long ago learned to live with: nonstandard standards.—*David Biedney*

els for viewing scanned images, but it allows editing only in the normal view. Drawing tools are available to add lines, circles, diamonds, and squares; a 300-dpi FatBits feature enables you to add or remove pixels. A crop tool lets you save or print a selected portion of a scanned image.

The software I looked at (version 1.0) was unable to scan images larger than 8 by 9½ inches, but New Image says it plans to increase the scan area in an upcoming release. The new software will also save an image to disk rather than to available System memory.

MacScan saves scanned images in a wide variety of formats, including *PageMaker* 1.2, TIFF, *SuperPaint* LaserBits, *MacPaint* (only a section of the document), and PostScript. You can print images directly from within MacScan.

Assuming that New Image Technologies will continue to develop its software, the MacScan scanner appears to be a good value, providing the ability to digitize images rapidly at reasonable cost.

C-Scan 300

The hardware for the C-Scan 300 from Abaton was originally produced by Microtek. The unit is solid and heavy, with a large footprint. The excellent sheet-fed roller mechanism accepts a wide variety of page sizes and thicknesses.

The C-Scan 300 connects to the Mac's serial port (usually the modem port) rather than the SCSI port, so the scan rate is noticeably slower than that of SCSI-interfaced scanners. Scanning a full page typically requires three to four minutes. Since the cable that's provided has a DB-9 connector, you'll need a serial port adapter cable to connect the scanner to a Mac Plus or an SE.

Abaton's C-Scan software for the Scan 300 is quite distinct from the programs provided by Microtek and AST, which are virtually identical to each other. You work on-screen slider switches to select the number of gray levels and the halftone resolution, as well as to alter the contrast and brightness. You can accomplish mixed-mode scanning by defining areas to be scanned as either line art or continuous tone.

Once you've scanned an image, you can view it in a reduced-to-fit mode, in an expanded representation that simulates a 300-dpi view, in a 72-dpi actual-size view, or in FatBits. The software provides a pencil and paintbrush for editing. You can select and save sections of images to the Clipboard at either 72 or 300 dpi (although there's a size limit on the 300-dpi option), and you can print directly from within the C-Scan software. An option automatically prints a caption describing the settings used to create an image. This is a feature I'd like to see all scanner makers copy.

The quality of the images captured by the Abaton C-Scan 300 scanner are roughly equivalent to those produced by the Princeton LS 300 scanner used by MacScan, but I found that the C-Scan 300 often required several scans and setting changes to achieve the same quality that I got with only one, or at most two, scans on MacScan. Since the serially interfaced Abaton C-Scan 300 scanner is ten times slower than MacScan, its throughput is far less. On



The Face that Launched a Thousand Ships
The Abaton, AST, and Microtek scanners—all based on Microtek hardware—produce virtually identical images, but the Abaton scanner (output shown here) is by far the easiest to use. The sophisticated brightness and contrast controls offered by these packages resulted in more satisfying images than those produced by the Dest and New Image units.

the other hand, the C-Scan software is more stable and provides considerably more flexibility.

The C-Scan software I reviewed (version 1.0) couldn't save a graphic to a TIFF formatted file. It could save images in several other formats: Abaton (Normal), PostScript, BitMap (a QuickDraw BitMap record followed by raw data), *MacPaint* (576 pixels by 720 pixels), and noncompressed (readable by *PageMaker* 1.2 and 2.0). The C-Scan manual is very good, by far the best of this group.

A few caveats for C-Scan users: the system is incompatible with *MacServe*'s print spooler. And if your Mac is connected to a TOPS network, make sure all volumes on the Macintosh controlling the scanner are unpublished before launching C-Scan.

Although the C-Scan software is the most sophisticated of the scanner programs I evaluated, it is also the only copy-protected one. Since Abaton doesn't provide a backup disk, owners of the system are at considerable risk should their key disk become damaged. Although Abaton includes a program that allows three installations on a hard drive, I found that properly installed copies could easily become invalidated. Furthermore, the presence of copy-protected programs on a hard disk drive can prohibit the use of utilities that eliminate file fragmentation. This is a major failing about which I'd say more, except that Abaton says it will take the protection off in the immediate future. Abaton says it is also planning to support TIFF in a soon-to-be-released upgrade.

Microtek MS-300A

Although Microtek developed the scanner sold by both Abaton and AST, it has lagged behind both companies in developing an adequate image-manipulating program to drive the hardware. Microtek's VersaScan software (version 2.07) was relatively unstable, crashing more than a few times during testing. The program is a classic example of how not to implement a Macintosh interface. For example, you must have different settings for image scanning from different pull-down menus, meaning you cannot check all current settings simultaneously. Scans interrupted by a jam in the roller mechanism can't be canceled; instead you must reboot the Macintosh.

VersaScan does, however, give you considerable flexibility. You can scan images at resolutions ranging from 75 to 300 dpi in increments of 15 dpi. The program gives you 14 positions for setting contrast and brightness with a range of +28 percent to −24 percent. And you can choose to trade off levels of gray against resolution.

VersaScan 2.07 saves images in VersaScan format (compressed and noncompressed), PostScript format, *MacPaint* format, or TIFF (compressed and noncompressed).

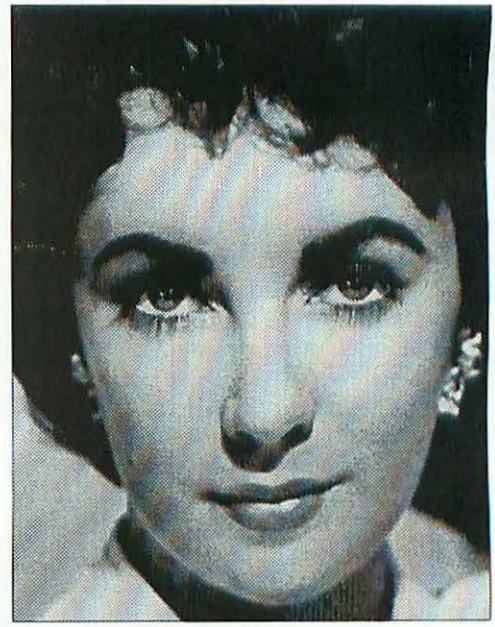
You can edit images in either normal or FatBits view using a pencil tool. More extensive editing requires saving a version of the image as a *MacPaint* file, editing that file with *MacPaint,* and then pasting the result back into the VersaScan image. This process does not, as one might think, degrade the resolution of a 300-dpi image. However, to call it tedious is an understatement. Furthermore, the Microtek system doesn't include *MacPaint.*

Images scanned with VersaScan cannot be printed directly from the program; you must save them as PostScript files, then download them to the LaserWriter or some other PostScript printer with a separate program. This means that to fine-tune a printed image, you must save the scan twice (first as a file that can be reloaded into the VersaScan, and then again as a PostScript file), exit VersaScan, launch a PostScript downloading program, send the PostScript file to the LaserWriter, exit again, and then relaunch VersaScan. If you need to change the settings and scan again, you must repeat this entire process.

Microtek is working on a new version of VersaScan that's much more sophisticated. It will be closer in style to Abaton's C-Scan, and many, if not all, of the serious limitations exhibited by the current version will be corrected. The new version may be shipping by the time you read this.

AST TurboScan

Like the Abaton 300, AST's TurboScan hardware is based on Microtek's scanner. The TurboScan software is very similar to Microtek's VersaScan software, but it's more stable. Changing scan parameters is also a bit less tedious, since most settings can be found in a single dialog box. As with the Microtek software, images scanned into TurboScan cannot be printed directly from the program; they must be saved as PostScript files and downloaded to a PostScript printer using a separate program.



Slow Thunder
This 100-dpi image from the ThunderScanner looks good, but it took some time to get right.

TurboScan saves images in several formats, including TurboScan (compressed or noncompressed), PostScript, and *MacPaint*. The version I evaluated (version 1.2) doesn't work with TIFF. You can place noncompressed TurboScan documents into *PageMaker;* but the noncompressed file must reside in the System Folder whenever you print the *PageMaker* document that contains the image.

ThunderScanner

The ThunderScanner from Thunderware is a unique offering. It essentially turns an ImageWriter printer into a scanner by replacing the ribbon cartridge with an optical reader, and it's one-tenth the cost of the other scanners. On the other hand, it's much slower than any of them—taking a hundred times longer at high resolution. For example, scanning an 8-inch by 10-inch halftone image with the MacScan took 17.7 seconds, whereas it took 34 minutes using ThunderScanner.

ThunderScanner's sophisticated software, ThunderScan, helps to compensate for its slow scanning speed. The latest version of ThunderScan (4.0) not only provides halftone capabilities equal or superior to those of other packages, it also offers several features no other package can match. For example, ThunderScan's lasso tool lets you select irregularly shaped areas for rehalftoning, cutting, and copying. With other scanners you often need to scan an image several times with different settings to get the image you want. With ThunderScan you can usually alter a scanned image to your satisfaction without rescanning. ThunderScan images can be rotated by increments of single degrees or surrounded by circular, triangular, or diamond-shaped frames. You can also change the image's standard dots to lines, providing a line-screen effect.

While I can't recommend ThunderScan for professional desktop publishing or for anyone who needs more than one or two scans a day, it's perfectly suited for scanning images on an irregular basis. It's an excellent way to break into the world of image digitizing at low cost.

And the Winner Is . . .

No one, really. If you possess a pioneer spirit and patience to match, most of these scanners can give you the ability to put high resolution digitized graphics into your documents. But without a critical need, I wouldn't purchase any of them at their current state of development. If your scanning demands are light and you don't mind waiting, consider the slow but inexpensive ThunderScanner. If you need to scan several high-resolution images on a daily basis, MacScan is probably your best bet. It scans entire pages in seconds, and it's the least expensive model (next to the ThunderScanner, of course).

Abaton's scanner and software are more capable and flexible than MacScan's, but the copy-protection scheme in the software is inappropriate for professional use. If Abaton has removed protection and added TIFF support as promised, this scanner will definitely be worth consideration. Both AST and MicroTek are also working on improved software that should make them contenders sometime this summer.

And that's probably the bottom line: while this technology is still immature, there is little doubt in my mind that better hardware and software are not very far in the future (see "A Realistic Solution"). If you're looking for an optical digitizer right now, shop carefully. Make sure promised features are actually in the software that comes in the carton rather than in the developer's mind. Determine whether the programs you currently use can handle the files generated by a scanner. And don't forget that no matter what scanner you buy, lots of memory and storage are crucial for handling large, high-resolution images. □

See *Where to Buy* for product details.

A Realistic Solution

After reading this review, some of you will come to the conclusion that the scanner software scene could be in better shape. Fear not: an as-yet unreleased program by Letraset, codenamed *Realist,* promises to resolve the scanner software muddle in a single stroke.

Realist is an extremely sophisticated PostScript gray-scale editor that emulates the capabilities of expensive digital retouching computers. The program will support various scanners directly, circumventing the limitations of individual scanning packages.

Once you've scanned an image with *Realist,* the fun begins. A full range of editing abilities enables you to modify the scan in just about any fashion imaginable: full interactive control is provided for brightness, contrast, gray-scale remapping and quantization. The zoom feature allows multiple levels of editing, from full page to a 300-dpi FatBits mode. You can scale any area of an image in any way while retaining correct shading, a feature found only in larger dedicated graphics systems.

Using the various editing tools, you can soften hard edges (with the equivalent of an electronic water droplet), smear tones into each other (electronic finger painting), shade areas with a "charcoal" tool, or fill them with a pattern or gradient. You can even restrict fills to the area occupied by a specific shade of gray. Each tool has a myriad of modes and settings, far beyond what could be described in this space.

Realist outputs graphics in a number of formats, including EPS, TIFF, and *MacPaint.* It was promised for release by early this summer, so it may even be out by the time you read this.
—David Biedney

Into the 4th Dimension

by Lon Poole

Mystery surrounds the *4th Dimension.* Born in France, then nurtured secretly in California under Apple's wing for more than a year, the powerful new database management program has now returned to the care of its original developers. During its tenure at Apple, the program was code-named "Silver Surfer" after 23-year-old programmer Laurent Ribardière's favorite comic book character (see *Macworld News,* June 1987).

Like the comic character who explores the universe in search of new worlds, *4th Dimension* promises to create a small cosmos of applications, since it is actually two potent programs in one: a powerful relational database manager and a complete application-development environment.

4th Dimension has been available in France for two years, where it has been used to develop a range of custom applications that encompasses accounting, document-retrieval systems linked to videodisk players, interactive pictorial medical education, and even adventure and action games.

Database Structure

As a database manager, *4th Dimension* lets you visually define a file structure with up to 99 files. Each file may contain up to 511 fields per record, and field types run the gamut: alphanumeric, text, real, integer, long integer, date, and picture. Text fields can vary in length up to 32,767 characters per field. Any field type other than text or picture can be indexed for faster searching and sorting. You decide whether or not indexed fields must have unique values. Fields may also be marked for mandatory entry, and may be designated display-only or unmodifiable. In addition, you can create a scrollable list of standard choices for all but picture fields. Later, when you enter or change records, you enter a value for the field by clicking a choice on the list—no typing is required.

Once you've created your files, you can draw lines to link them together. For example, rather than waste space repeating a customer's address in every invoice, you can link the invoice file to a customer file. One field in an invoice record identifies the customer, and *4th Dimension* automatically finds the customer record and makes all its information available, as if it were part of the invoice record.

Very few database managers offer an elegant solution for defining a file whose records have varying numbers of fields. *4th Dimension* solves this problem with a special type of field, called a *subfile,* that makes a dependent file the "value" of the field. For example, a subfile that contains line items for an order file allows an individual order record to have any number of items from none to 16 million (disk space permitting, of course).

Input and Output Form Design

Through layouts, you enter, view, print, and otherwise input and output information from the files in your database (see Figure 1). *4th Dimension* can create eight layout designs automatically. You may

Launching a first exploration of a powerful new database manager



SCOTT BALDWIN

Analysis

I've been a fan of *4th Dimension* from the first time I saw it in November 1986, when it was known by the code name Silver Surfer. Since then it has gone through a custody battle that makes the struggle for Ewing Oil on TV's "Dallas" seem tame.

First it was to be published by Apple, next an unnamed software publisher was set to buy it, then Apple was going to kill it off to please the other database publishers, and finally it was resurrected under its original French name of 4th Dimension. All this confirms a basic rule of software: great programs never die, they just get acquired.

Database Programming Language

The key to *4th Dimension* is a command language specifically designed for database programming. Serious database applications require extensive control over the data-entry process, with strict rules for verifying additions and changes. Repetitive transactions and reports must also be processed. The only way a developer can have complete control over such an application is with a programming language.

Some Mac users claim that a visual interface eliminates the need for a programming language, but this is just wishful thinking. In real life, pictures by themselves are rarely enough to fully describe a multistep procedure or a set of interrelated details. Imagine giving someone directions to your house with just a map, using no additional words to describe the important turns and landmarks. Even comic books have a text narrative.

Database application developers want to control what a program does and when it is done, but they don't want to know the dirty details of how the operation was carried out. To program on the Macintosh with a traditional language like Pascal or C, you have to study hundreds of pages of arcane Toolbox calls listed in Apple's programmers' bible, *Inside Macintosh*. A *4th Dimension* programmer can use commands (such as Save Record to write a record to disk) without knowing any of the system-level details.

Database Publishing

Instead of having to concentrate entirely on the content of database output, *4th Dimension* programmers can also assume a great deal of control over the quality of presentation. Just as Mac word processing inevitably led to the current desktop publishing craze, the combination of *4th Dimension* and the LaserWriter will open up the equally important area of database publishing. For many print applications, such as price catalogs and financial reports, you'll need more database management and programming control than page-layout programs like *PageMaker* can provide.

4th Dimension has caused a lot of excitement in the Mac community, even though only a handful of people have seen it. After logging over 200 hours with a prerelease copy, I'm convinced that many users of other Mac databases and even PC databases will want to switch over to *4th Dimension*.

– Adam B. Green

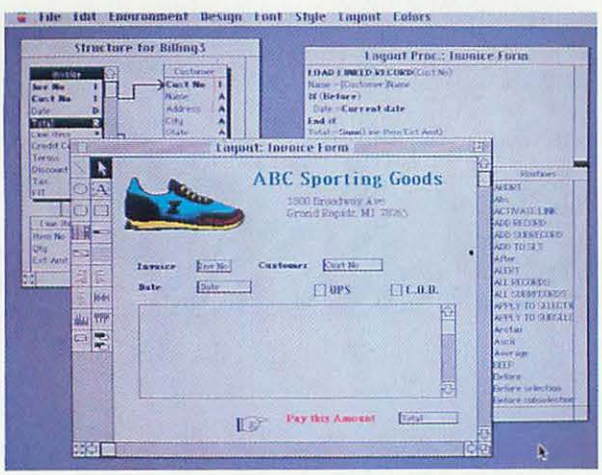


Figure 1
In separate windows, you work on database structure, design input and output layouts, and program procedures. In other windows (not shown here), you set up custom menus and establish a password hierarchy.

change them or design your own from scratch using a graphics editor that works like *MacDraw*. With the layout editor, you draw lines and shapes, type text in any font or style, position objects, paste graphics from *MacPaint* or *MacDraw*, and so on. A layout can include fields from the file with which it's associated or from any other file linked to that file. In addition, a layout can include standard buttons, radio buttons, check boxes, graphs, scrollable lists, and variables, although you must program *4th Dimension* procedures to make much use of them. Layouts can even include other layouts. You can create as many different layouts as will fit on your disk, and each layout can have a different selection, format, font, style, and arrangement of objects. You also control the foreground and background color of every layout object.

Programming

4th Dimension's structured programming language, with 200 standard commands and functions, is similar to Pascal without the strict control of variable types. You can create your own procedures and functions and then use them just like the standard ones. It's also possible to use external procedures written in Pascal, C, assembler, or some other language.

You can control record selection, set manipulation, data manipulation, links, data input and output, telecommunications, buttons, fonts, dialog boxes, windows, and menus. As a high-level language, *4th Dimension* requires relatively little programming effort. For example, managing a standard window requires over 300 lines of Pascal versus 3 lines of *4th Dimension* code.

You write a procedure using either of two procedure editors. A listing editor creates conventional text-only programs. A flowchart editor shows program structure graphically with boxes that depict program steps and tests, plus interconnecting lines that map program flow. With either editor, entering program statements requires little typing. You can type keywords, file and field names, and procedure and function names or you can select them from scrollable lists.

User Environment

4th Dimension's user environment handles many standard database management tasks such as adding, modifying, and deleting records. It also lets you perform multiple-criteria searches and sorts with up to 30 sorting levels (see Figure 2). You can define and print columnar reports with subtotals and totals, print mailing labels according to your predesigned layout, or print up to eight types of graphs (see Figure 3). Additionally, you can import or export data in SYLK, DIF, or ASCII format through a configurable character-substitution table. All this requires little or no programming, depending on the complexity of the database. Since most of your programming is effective in the user environment, you can customize the environment for testing stand-alone applications you're developing.

Custom Environment

By adding custom menus and the necessary programming, you can turn any database into a custom application (see Figure 4). *4th Dimension* gives you complete control over the menu bar (with the exception of the Apple and Edit menus, which cannot be deleted). You create menus using a menu editor that provides simple commands for changing menu bars, checking and unchecking individual items, disabling and enabling individual items, and so forth. If you design it carefully, your *4th Dimension* application will be indistinguishable from one written in Pascal or another conventional development system.

Developing an application in *4th Dimension* is a very fluid experience. You can redefine the file structure at any time, adding and deleting files, changing field types and attributes, moving links, and so on, even if the database already contains data; *4th Dimension* automatically makes the necessary adjustments. If you want to change the way you enter or view the information in your database, just change a layout or draw a new one.

Since *4th Dimension* is a multiuser application, each user must have a copy of the program, but the database files can reside on a file server. Hierarchical password security is available to restrict access to any menu item or layout. The password system also tracks how many times each password is used and when it was last used.

Overall, *4th Dimension* offers tremendous promise for developing exciting new applications with a truly Macintosh flavor. I suppose it's suitable to say that with *4th Dimension*, only *time* will tell. □

See *Where to Buy* for product details.

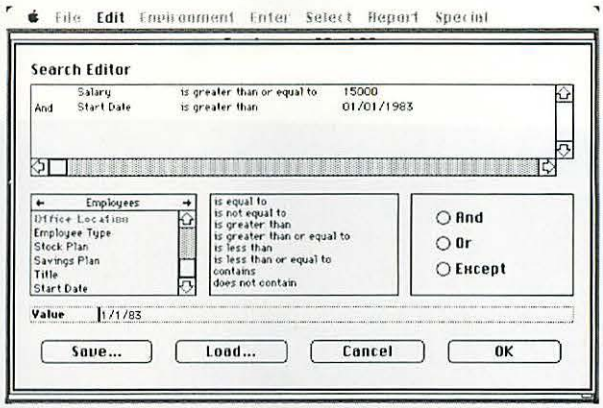


Figure 2
To find records that meet certain criteria, you build a formula of any complexity. Point and click to select field names and comparison operators; type to specify comparison values. Searches can also be programmed.

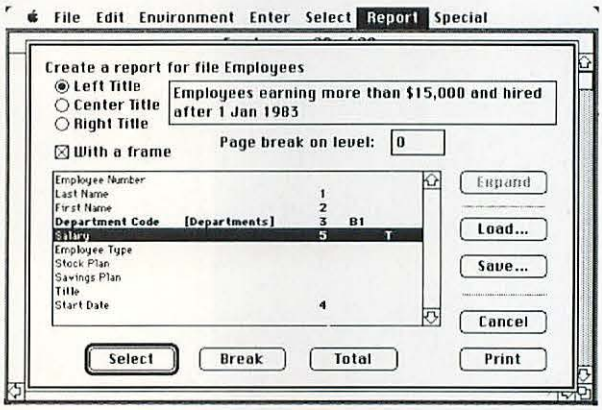


Figure 3
Simple columnar reports can be quickly generated using a typical part of the 4th Dimension *User Environment, the report editor. You select each field in turn, and indicate which fields to use for subtotal breaks. Report specifications can be saved to disk for later reuse.*

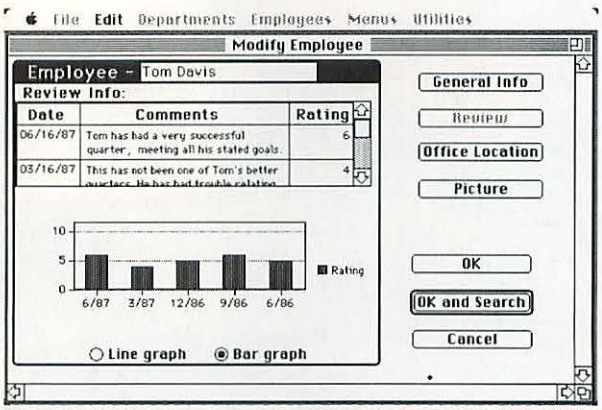


Figure 4
Applications created with 4th Dimension *look and feel as if they were created with a conventional programming language. This personnel management application has custom menus, buttons, radio buttons, a graph, and a scrollable list.*



The 25.3MB Northern Telecom drive.

Raising the Roof on Storage

Macworld goes shopping for a high-capacity hard disk and finds a wealth of storage

by Ric Ford

Whether you're a musician working with sound samples, a visual artist manipulating digitized images, or an analyst working with a large corporate database, you can benefit from the new high-capacity hard disk drives available for the Macintosh. Whereas drives capable of storing hundreds of megabytes were previously available only for minicomputers or mainframes, now you can buy them for the Macintosh at half the former cost. And the Mac versions are just as fast.

The drives I compared represent the state of the art; all offer high performance in compact packages at reasonable prices. Because they've been available for a relatively short time, though, I wasn't able to uncover every little bug and incompatibility. And like most new products, some of these drives have their share of rough edges. I'll point out a few things to look for and explain how the products differ, but because designs change at a rapid pace, it's best to check with the manufacturer on a drive's status before you buy.

More Storage for the Dollar

Although the hard drives available for the Mac have been criticized for being too expensive, the cost per megabyte shrinks when you move up to larger drives (see Table 1). Apple's latest System 4.0 and Finder 5.4 releases correct many previous problems with high-capacity disks; however, some manufacturers still require System 3.2. Check with the manufacturer for the correct System and Finder versions to use. Right now the only serious limitation in the Macintosh architecture is the Finder's performance when large numbers of files (more than one hundred) are on the desktop. You can work around this limitation by partitioning the disk into multiple logical volumes, using the partitioning software supplied with some of the disks. Infosphere's *MacServe* also provides for volume partitioning in addition to its networking functions. Alternatively, the number of files on the desktop can be reduced by properly setting up hierarchies of folders. For UNIX users, Apple's A/UX on the Mac II promises to alleviate the problem of dealing with thousands of files on one disk.

Performance

With such a wide range of sizes and prices to choose from, the next factor to consider is performance. Fortunately, the higher-capacity hard disks offer more speed to accompany their increased storage capacities and prices. If you're processing large databases, or graphics or sound files, the speed differences can be quite noticeable. And if the disk is going to be shared on a network, the higher-performance drives will let more users share data without sacrificing too much speed.

One thing to remember is that in disk performance, the Mac SE substantially outpaces the standard Mac Plus. And the Mac II, with its true direct-memory-access (DMA) SCSI interface, has the potential to perform much faster than even the SE.

All the drives I tested worked well with *AppleShare. TOPS, MacServe,* and *HyperNet* should also work with these drives; however, I wasn't able to test the drives with these packages.

To measure drive performance I ran a series of tests using Steve Brecher's public domain *DiskTimer II* program and a few other tests that are more representative of the performance you'll get when using the drive (see Table 2).

DiskTimer II tests the raw performance of the drive. Proponents of the test argue that it isolates a drive's performance from other random variables that could invalidate a performance test. Detractors say it overlooks operating system factors that

PHOTOGRAPHS BY JEFFERY NEWBURY



Three to Grow On
Peripheral Land, LoDown, and AST were among the first to establish a solid reputation in the hard drive market. Shown here (clockwise from left): the Peripheral Land PL172, the LoDown LD-155, and the AST-4000.

Table 1
If you compare the cost per megabyte, two of the drives tested are less than half the cost per megabyte of a typical 20MB drive.

	Price	Disk Capacity (MB)	Cost/MB
Drive			
Direct Drive 80	$1380	77	$17.92
CMS S240	$4195	225	$18.64
SunStreak SCSI-245	$7495	235	$31.89
PL172	$4995	150	$39.97
Typical 20MB disk	$900	20	$45.00
Disk/tape combo			
MagNet 172x	$6995	140	$49.96
SS400/Mac261	$11,800	253	$46.64

affect the drive's performance in the real world. The write test measures the time it takes the drive to write a 24K data block. The read test measures the time required to read the same data block. The access test measures the time it takes to read 512 bytes and then read a second 512-byte block located 1 megabyte away.

Sizing up the Competition

You'll find a wide range of sizes and shapes among these large-capacity disks. The Jasmine Direct Drive 80 is small enough to fit into a briefcase, while the Northern Telecom unit requires two people just to lift it out of the box. All are reasonably quiet; even the relatively loud Peripheral Land PL172 would probably fade into office background noise, and the others are generally quiet enough for home use. All drives tested have fans.

One drive comes with 25-pin SCSI connectors, and all the others have 50-pin connectors. The drives with 25-pin connectors require less-expensive cables, but both types of connectors work fine. A much more serious concern is how you set the SCSI address. If you have a Mac SE with an internal hard disk, all external drives must be set to an address other than 0, or the system won't start up properly.

Some drives come with the address preset at the factory, while others provide a push button on the outside of the cabinet for changing the address. Three drives have jumpers that you change. The push-button method is by far the easiest—the only potential problems are accidentally changing the address by bumping the switch, and attempting to use addresses 7, 8, and 9, which are off-limits on the Mac. These minor concerns are more than made up for by the ease with which you can readdress the drive.

You'll find a wide range of sizes and shapes among these large-capacity hard disks.

Drives with Utility

Backing up disks is a necessity. Take it from someone who has had more than one hard disk fail suddenly and completely, without any warning. Some of the drives include built-in tape backup units and flexible backup and restore software—a real advantage. Others don't, and you'll have to buy a separate tape drive or a removable cartridge drive for backing up the data. Even the smallest-capacity drive tested, the Jasmine 80, is much too large to have its contents backed up onto floppy disks—it takes one hundred 800K floppies, or more than fifty 1.6MB disks, to back up 80 megabytes.

A utility program that rewrites the hard disk's driver without reformatting the disk can be crucial; it may allow you to recover lost data when the disk is malfunctioning. The driver is a critical piece of the hard disk puzzle, and manufacturers are constantly modifying it to accommodate new Macs and improve performance. Some of these disks come with a driver-update utility—named "manager" or "mount"—and

some require you to reformat the disk before updating. All the hard disks reviewed offer a program for reformatting the disk, but this should rarely be done, because it destroys whatever data is on the disk. The Jasmine drive employs a unique method of hard sectoring that preserves the data after a reformatting operation.

A few manufacturers offer print spoolers along with their drives. Jasmine and Mirror use Think Technologies' *LaserSpeed* (see "Speaking of Spoolers," *Macworld,* June 1987). Since print spooling software is available separately, you should consider it a bonus rather than a necessity.

	DiskTimer II Results (in tenths of a second)			Real-World Results (in seconds)	
	Read	Write	Access	Duplicate 766K file in Finder	Open 66K MacWrite file
RAM disk[1]	17	17	0	3.75	9
PL172[2]	53	56	11	7	13.5
SS400/Mac261	65	170	13	15	14.5
CMS S240	101	170	9	14	14
Jasmine 80	129	126	21	13.5	14.5
MagNet 172x	157	175	14	17.5	14.5
SunStreak SCSI-245	138	439	11	25.5	14.5
PL172[3]	238	230	13	24	14.5

[1] RamStart 1.23 [2] Turbo Format 4.1 [3] Format 4.0

Table 2
DiskTimer II *provides only raw measurement statistics, while the two real-world tests are better indicators of the actual performance you can expect from the drives.*

A Look at the Drives

CMS S240

This workhorse offers a huge capacity in a small, shoebox-sized package that can sit quietly on your desktop. Its performance is speedy, especially when compared to smaller drives, and CMS bundles in *Hard Disk Partition,* so you can store thousands of files on the drive by separating them into logical volumes. *Hard Disk Partition* also offers some security by letting you choose an optional password for each volume. You create, delete, mount, and unmount volumes from a desk accessory. The volume size is limited to 32MB each.

You can change the SCSI address from the outside of the S240's case, although you must use jumpers. The manual and the utility programs are good, and CMS offers a one-year warranty. Although the price per megabyte is one of the lowest, you'll have to shop elsewhere for backup and spooling capabilities.



Storage Trio
Shown clockwise from left: Mirror's MagNet 172x, CMS's S240, and Sunol Systems' SunStreak SCSI-245.

Jasmine Direct Drive 80

You can easily fall in love with the quiet Jasmine drive. First, it's amazingly compact, fitting easily under the Mac or into a briefcase. And despite the bargain-basement price, it comes with extras like a push-button SCSI address selector, an air filter, surge protection, and two extra AC outlets in back; Jasmine also offers a one-year warranty. The drive ran flawlessly during the review period, with very good performance and no compatibility problems of any kind. The utility software is good, and the *LaserSpeed* spooler is included. The manual wasn't finished at the time of this review, but if the Direct Drive 20 manual is any indication, this one should be fine.

MagNet 172x

This drive from Mirror Technologies comes complete with built-in tape backup and two flexible backup/restore programs: one for *AppleShare* and the other for normal backup. The utility programs are complete and well-designed, and *LaserSpeed* is included. The only features missing are volume partitioning and an external SCSI address button. The MagNet is quiet, and it's compact enough for a desktop (about the same size as the CMS S240). Though you pay a little more to get the tape backup, the MagNet is less expensive than some of the other drives on the market. All in all, it's an attractive package for network or business applications.

High-Capacity Hard Disks Compared

Company	Reviewed	Formatted Capacity (MB)	Price	Warranty	Fan	SCSI Connectors	SCSI Address
CMS	•	225	$4195	1 year	•	two 25-pin	0-6; external jumpers
Jasmine Computer Systems	•	77	$1380	1 year	•	two 50-pin	0-6; push button
Mirror Technologies	•	140	$6995	1 year	•	two 50-pin	5; internal jumpers
Northern Telecom, Memory Systems Division	•	253	$11,800	2 years/1 year[2]	•	two 50-pin	0-6; push button
Peripheral Land	•	150	$4995	1 year	•	two 50-pin	2; internal jumpers
Sunol Systems	•	235	$7495	6 months	•	two 50-pin	0; factory set
Bering Industries		100	$3995	90 days[5]	•	two 50-pin	external switches
Bering Industries		145	$3895	90 days[5]	•	two 50-pin	external switches
Century Data Systems		83	$5495	1 year	•	two 50-pin	external DIP switches
Softworks Limited		105	$2499	6 months (ext.)	•	two 50-pin	internal jumpers
Softworks Limited		140	$3495	6 months (ext.)	•	two 50-pin	internal jumpers
Softworks Limited		170	$3995	6 months (ext.)	•	two 50-pin	internal jumpers
Softworks Limited		270	$6495	6 months (ext.)	•	two 50-pin	internal jumpers

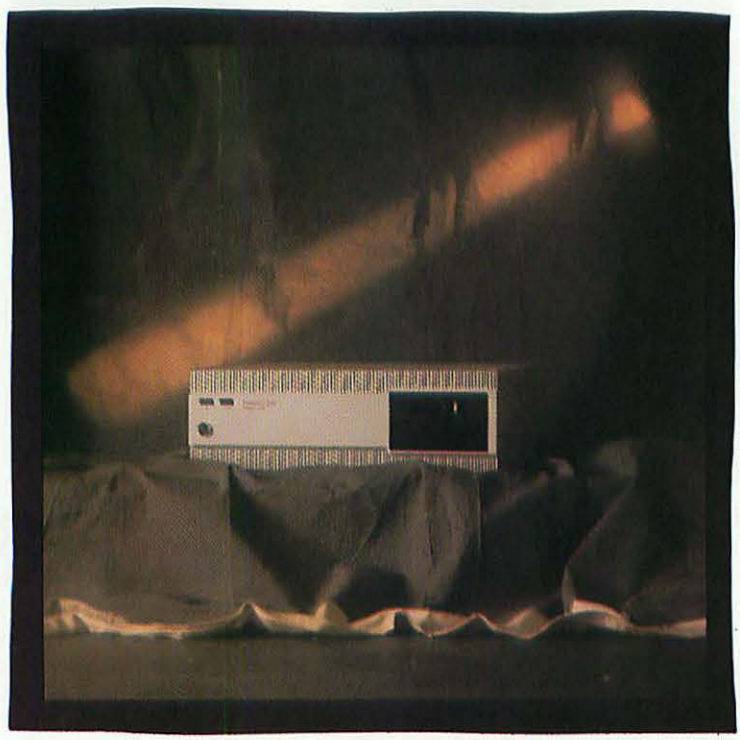
[1]Standard backup free; full-featured backup available for $25.

[2]Drive: two years/other components, one year.

[3]Automatic bad-block remapping.

[4]There are two formatting programs; one is much faster.

[5]Extended warranty available.



Breaking the Gigabyte Barrier
Mirror's ProStation 1024, the first expandable drive to offer up to a gigabyte (1024MB) of storage, is ideal as a large network server. The ProStation comes with either a 40-, 120-, or 240MB tape drive for backups. The cabinet is designed to sit under the Mac II and includes SafetyNet network-backup software.

Northern Telecom SS400/Mac261

This disk drive looks like a minicomputer from Digital Equipment or IBM, and it's priced accordingly at $11,000. It's also big: a hefty 85 pounds. That's a lot to carry around, so it has casters on the bottom to make it more transportable. The drive is fairly quiet, although it does make some loud noises at start-up time. Northern Telecom uses its own 8-inch hard disk inside, which is guaranteed for two years. A pop-out tape drive in the front is used for backups, and a push-button SCSI address selector is provided on the back. It has first-class hardware and software and good disk performance. Volume partitioning is built-in, and the backup and utility programs are both very good. Even the manual is superior. Performance was brisk, and I encountered no problems or incompatibilities at all during the test period. The SS400 makes a very good network file server with its speed, backup, and robust design.

Peripheral Land PL172

This drive is like a sports car in character—fast, expensive, and a !ittle noisy and temperamental. It's an attractive, vertical drive, about twice the width of a DataFrame, and can sit conveniently beside a Mac.

Termination	Drive Manufacturers	Volume Partitions	Backup		Utilities			
			Full	Incremental	Driver Install	Test	Format	Print Spooling
internal	Maxtor	●			●	●	●	
internal	Quantum	TBA	●[1]	●[1]	●	●	●	LaserSpeed
internal	Micropolis		●	●	●	●	●	LaserSpeed
external	Northern Telecom	●	●	●	●	3	●	
internal	Fujitsu/Priam/ Toshiba	●	●	●			●[4]	
internal	Maxtor/Newbury						●	
external	Iomega/Cahner/ Quantum		6,7	7	●	●	●	
external	Toshiba/Micropolis/ other		6,7	7	●	●	●	
external	Amcodyne	fixed sizes	●		7	7	7	7
internal	various				●	●	●	
internal	various				●	●	●	
internal	various				●	●	●	
internal	various				●	●	●	

[6]Backup using Finder.

[7]Software in development at time of writing.

The PL172 is like a sports car in character—fast, expensive, and temperamental.

I did encounter some difficulty, though, which I finally traced to the start-up sequence. Unless you start the PL172 and wait for it to come up to speed before powering on the Mac, it may get confused and not start at all. It also took me a while to realize that the two ports on the back are not the same—one is intended for connecting to the Mac, and the other is for additional disk drives. If you don't use the correct one, the drive may not work.

Once it's running, the PL172 is the fastest of the bunch, if it has been formatted using the special Turbo Format 4.1 utility. Using the regular Format 4.0 resulted in performance that was just average for the group of drives tested. The tests I ran clearly demonstrated the importance of the driver software. Unfortunately, the PL172 has no provision for rewriting the driver software without destroying all the other data on the drive. SCSI addressing is also cumbersome—you must open the cabinet to set the jumper switches.

Peripheral Land does provide backup software and its own volume-partitioning utility, but the manual isn't too impressive. I also encountered some crashes using the volume mount program, although no data was lost.

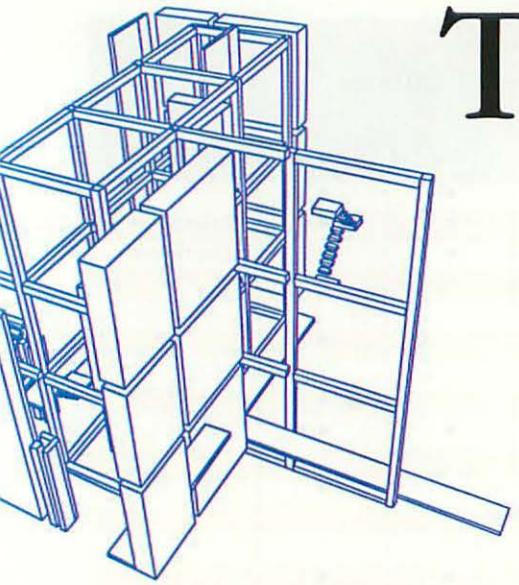
Sunol SunStreak SCSI-245

The Sunol SunStreak presents an interesting contrast to the CMS drive. At the heart of each is a Maxtor drive, but the Sunol is three or four times the size of the CMS. Sunol doesn't provide any easy way of changing SCSI addresses and presets the address to 0, which conflicts with the internal hard disk of a Macintosh SE. It has a meager manual and provides no programs for backing up the hard disk or installing a driver without destroying the data on the drive. The warranty lasts only six months.

High-Capacity Shopping

The products reviewed had a surprising number of unique characteristics, considering that SCSI disks have become a Mac commodity. You can choose from a wide range of prices and capacities, and any one of the drives should prove satisfactory for Mac Plus, SE, and II owners.

The Jasmine 80 is a very nice unit at an extremely good price. In fact, you could buy two—one to back up the other. The CMS S240 outclasses the Sunol SunStreak, but you'll need to shop for a backup system unless the disk is shared in a way that allows many users to handle their own backups individually (usually not a good idea). The Peripheral Land drive is the hot rod of the group, a good choice if you need top performance right away—but other manufacturers will undoubtedly catch up with similar high-speed driver software. The Mirror MagNet 172x is a sort of half-sized version of the Northern Telecom S261, and these two provide the advantage of built-in tape backup at a higher cost per megabyte. □



The Architect's Apprentice

In large and small practices, the Mac is changing the way architects think about design.

by Stuart Silverstone

Hard at work on a renovation project at the California firm of Neil Stanton Palmer, architect Barry Isakson found he could produce an elegant construction document in a fraction of the time it would have taken him with the traditional methods of manual tracing and drafting. Using *MacDraw* and a ThunderScanner, Isakson was able to combine text labels for construction procedures with a digitized image of the building facade.

Such an innovation, while not the most important or most typical Mac architectural application, shows how architects around the country are integrating Mac technology into their practices.

The eager architects who responded on an emotional level to the Lisa, or who adopted the Mac early on, haven't always found the machines easy to use in their practice. They doggedly plowed ahead with the versatile but limited *MacPaint* and *MacDraw* software, until more serious drafting tools emerged.

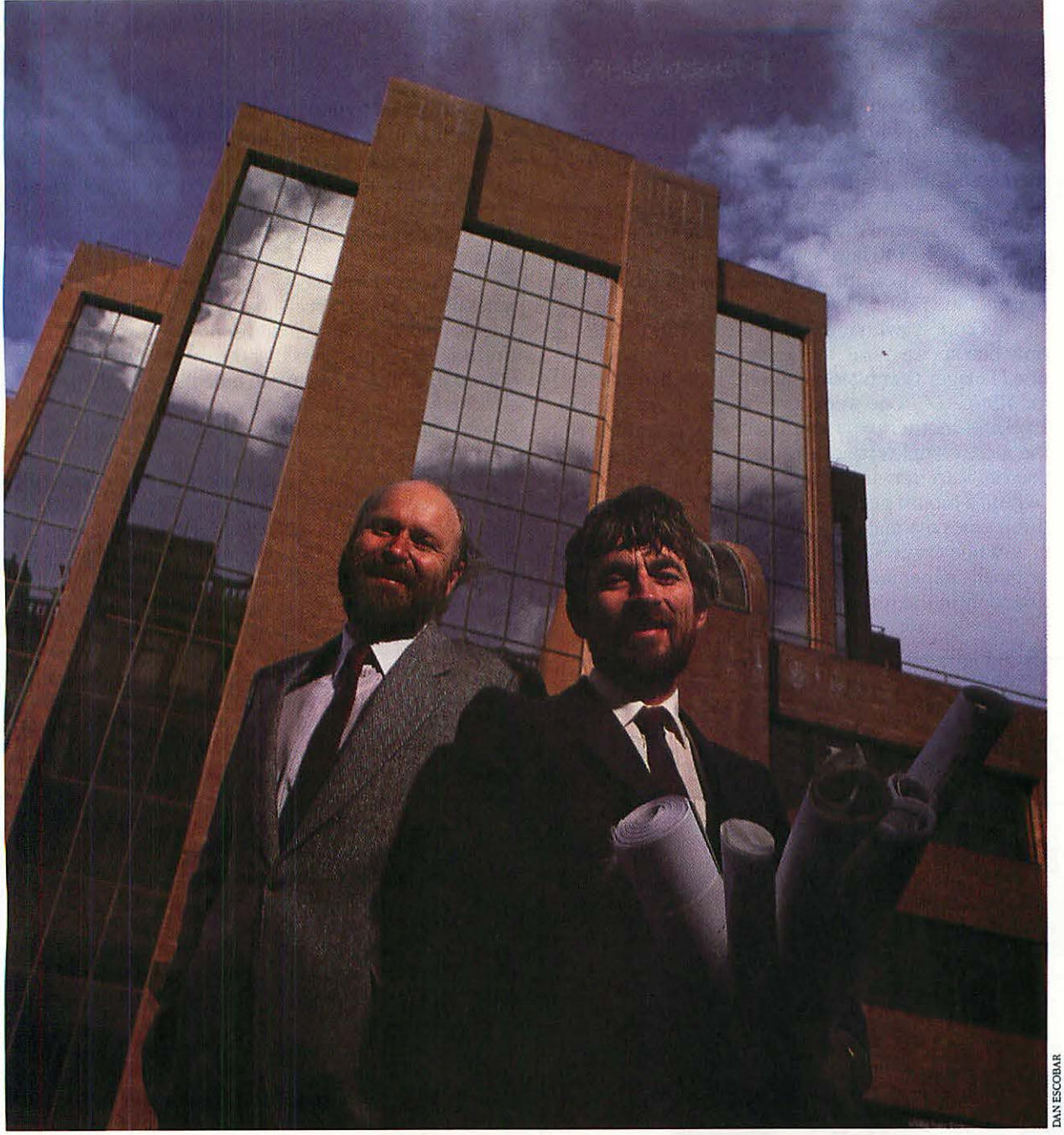
But even with the arrival of today's special-purpose CAD packages and sophisticated peripherals (such as the LaserWriter), architects still choose the Mac for the same reasons they originally did. "The Mac overcomes the two main objections to CAD, especially for small offices," says Florida architect Chuck Carroll. "The start-up cost is one third of other computer systems, and the learning curve is a fraction of the time." San Diego landscape architect Niles Nordquist adds, "Hardware and software are relatively inexpensive. The real cost of CAD is in training, and the Mac is the simplest and fastest machine to learn."

Drafting Plans

Large architectural firms working on major projects still require the special abilities of minicomputers and graphics workstations for drafting purposes (for example, the Mac Plus can't drive electrostatic plotters, nor can it manipulate the hundreds of layers sometimes required for a single set of plans). Small and medium-size practices, however, increasingly turn to the Macintosh to produce plans for everything from houses to shopping centers, hospitals, and commercial buildings.

Of the many software packages available for producing traditional architectural drawings—floor plans, elevations, cross-sections, and large-scale details—no clear winners have yet emerged as the best overall or the best for a particular task. Architects may choose *EZ-Draw, MacDraw, MacDraft, MGMStation,* or *MiniCAD* to do the same type of job, based on their own preferences or product familiarity. The choice does not seem to be based on software costs—price differences are easily justified for a tool used daily in a professional practice. Far more important considerations are speed and ease of operation, the way features fit individual working styles, and training costs.

Some architects use *MacDraw,* for example, to perform functions that other architects accomplish with one of the many special-purpose, high-powered CAD software packages. *MacDraw*'s ease of use and versatility are its drawing cards. For complex floor plans, elevations, cross-sections, and construction details, however, the Mac's generic drawing tool is quite limited. This is why Tim Johnson, MIT architecture professor and a computer graphics pioneer, came up with his own solution. Creator of the first 3-D graphics



DAN ESCOBAR

Tom Moore (left) and Doug Campbell, in front of the Mac-designed Victoria Center. Their Victoria, B.C., firm is "100 percent Mac" according to Moore.

system, *Sketchpad III,* in 1963, Johnson developed the *Sizer and Adjacency* desk accessory to provide *MacDraw* with inexpensive CAD capabilities (see *Reviews, Macworld,* March 1987).

With this enhanced form of *MacDraw,* New Hampshire architectural designer Ed Cundy produces everything from preliminary schematic drawings to complete sets of final working drawings. Cundy works by himself, primarily on residential and light commercial projects. *Sizer and Adjacency* enables Cundy to lay out entire drawings accurately in *MacDraw* without taking the time to zoom in from Reduce-to-Fit mode. The desk accessory lets you use a dialog box to size *MacDraw* shapes precisely according to a preselected scale, and the adjacency features snap sized elements into place automatically.

Although Cundy wishes *Sizer* could measure diagonal lines and would like to see a zoom feature in *MacDraw,* he says his projects don't really require the precision and features of advanced CAD programs. "I can create any architectural drawing at any scale, extract its dimensions, and label them with great accuracy, while retaining *MacDraw*'s screen-refresh speed and efficiency," Cundy explains.

The Victoria, British Columbia, firm of Douglas A. Campbell is, according to principal Tom Moore, "100 percent Mac—we don't use pencils." The company's most recent project is a $7.5 million 150-room hotel located in Victoria.

The 12-person firm has four 512K Macs and two Pluses running with a 20-megabyte hard disk over a *MacServe* network. Moore says staff members formerly used *MacDraw* for many purposes but have now switched almost entirely to *MiniCAD,* because it combines a natural drawing style and the ability to work with up to 40 layers. While the 512K Macs diminish *MiniCAD*'s performance, they are tolerable for the present (see Figure 1).

Of course, with more complex software, training time becomes a more important consideration. General Manager Owen Moore figures the learning curve for *MiniCAD* is one week for working at a residential level and another two months to become familiar with the more complex routines and shortcuts–although you can start drawing within hours. He adds that "within a month people should be working at two to three times manual drawing speed."

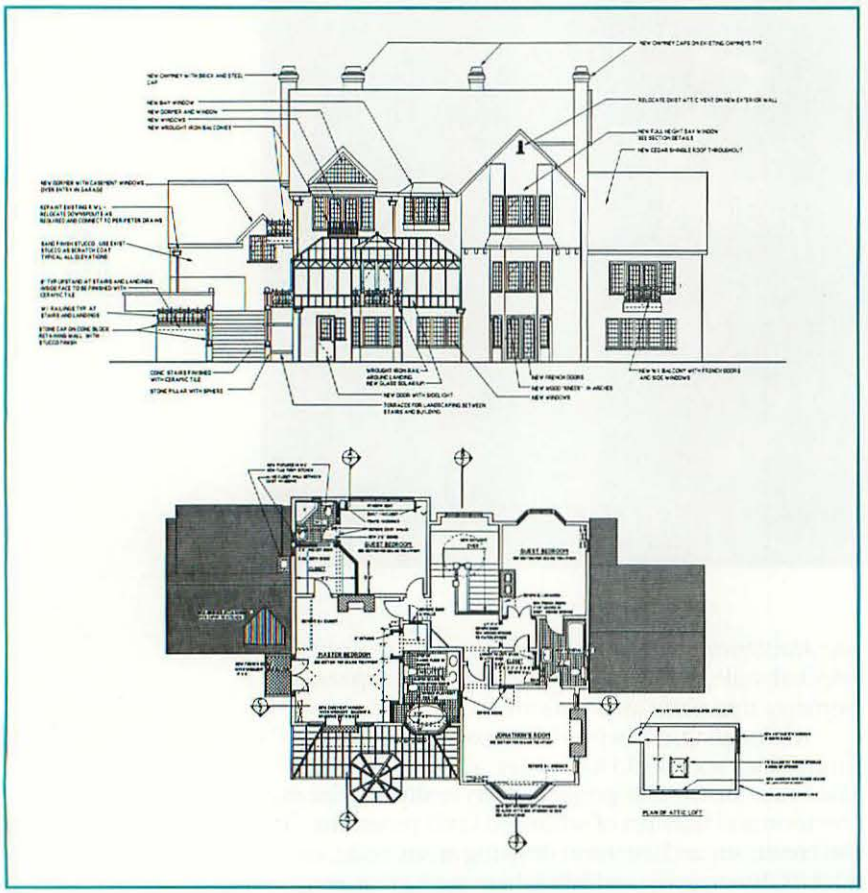
While Owen's brother Tom Moore says that he originally expected computerized drafting to save time only in the revision process, he has been pleasantly surprised to find that Macs are actually faster for initial drawing than are manual methods. Another unexpected benefit of the all-Mac practice, according to Moore, is that it enables the firm to lower its overhead by saving on office space, since a Mac workstation takes up about half the room of a traditional layout area.

Architect Joseph Bayer, of Hermitage, Pennsylvania, says the Mac is crucial to his one-man practice: "It enables me to remain small yet productive." Of Mac drafting Bayer observes that the more repetition involved in a project, the more time he saves. Regarding a recently designed 60-bed motel, Bayer comments, "Once I'd laid out one room, I'd virtually laid out the whole project."

After trying many CAD packages, Bayer now uses a combination of *MiniCAD* for presentations and design drawings and *MGMStation* for final working drawings. In addition to its "more natural" drawing style, Bayer finds *MiniCAD* appropriate for presentations because of its ability to cut and paste bit-mapped clip art and digitized graphics. While he feels that *MGMStation* is not "architect intuitive," he uses the package for construction drawings mainly because it offers superior dimensioning features.

Bayer's advice to anyone considering CAD on the Mac: get a large-screen monitor. His choice was the Stretch Screen, from Network Specialties.

Figure 1
The plans and elevation for this Victoria, B.C., home were created in MiniCAD and plotted on a Houston DMP52. Drawings by Douglas A. Campbell, Ltd.



Output

One of the main concerns for architects considering the Macintosh is whether it can produce the large drawings–up to 30 by 42 inches–that are the traditional format for construction plans. While some architects have developed techniques for working around the size limitations of the standard Mac output devices, others opt for drafting line-plotters. Both approaches involve trade-offs.

Pen plotters are probably the output devices with which architects are most familiar. Plotter drivers such as *MacPlot* or *MacPlots II* enable the Mac to work with a wide variety of pen plotters. Plotters have the advantages of being able to produce very fine (up to 1/1000-inch) color lines and large-format, single-sheet drawings. On the other hand, they lack the quality typography, fill patterns, speed, and convenience of Mac printers.

A wide-carriage (15-inch) ImageWriter is the solution for Boston architect Bill Bunting. Two 15-inch printouts spliced together form standard sheet sizes up to 30 inches wide by 40 inches long. Bunting then uses standard photocopying techniques to transfer his design to a single reproducible transparency that can be revised as needed and reproduced for multiple drawing sets. Although the ImageWriter provides a simple method of producing adequate-quality output at a low cost, it lacks the high-resolution typography and fill patterns available from laser printers and professional typesetters. In addition, because the Image-

Writer doesn't print with 100 percent accuracy, lines that are supposed to match on spliced pages often vary by up to 1/16 inch.

The LaserWriter, on the other hand, gives architect Barry Isakson the ability to produce polished output quickly and easily. Since the LaserWriter has a paper-size limit of 8½ by 14 inches, however, Isakson must piece together multiple printouts to produce large drawings. He usually tapes together up to six small drawings of standard plans, details, and information schedules to produce a 25½- by 22-inch drawing sheet, which he then enlarges onto reproducible vellum using a high-quality Shacoh or Xerox 2080 copier (see Figure 2).

Architect Tim Johnson of Boston uses an Allied Linotronic 100 as an output tool. He accesses that expensive equipment by taking disk copies of Mac-drawn building plans to a local service bureau. Johnson then uses a Shacoh copier to enlarge the 8½- by 11-inch, high-resolution output 200 to 400 percent to create reproducible drawings of up to 34 by 44 inches. The results are professional-looking drawings that hold fine hairlines and have typeset-quality typography and a variety of excellent fill patterns.

One solution to the output problem is simply to avoid the large-size plans that are traditional in the building industry. For some simpler buildings, plans and elevations remain readable when printed on small drawing sheets of 11 by 17 inches or even 8½ by 11 inches. Some portions of a traditional set of building plans, such as large-scale joint details, are typically composed of small drawings grouped together on a large drawing sheet. When these drawings are produced on a LaserWriter on 8½- by 11-inch sheets, or 11- by 17-inch foldouts, they take full advantage of the quality and versatility of computer technology and yet remain convenient for the people who ultimately work with them. "I can use the Mac to create a set of working drawings at 11 by 17 inches with complete specs," says landscape architect Nordquist. "It's a great benefit for the contractor, who doesn't need to carry around a big, heavy set of drawings."

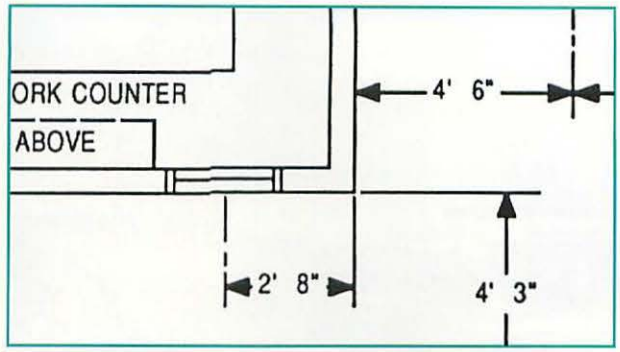


Figure 2
Architect Gregory J. Wolters creates 24- by 36-inch drawings by taping together LaserWriter-printed MacDraft *sheets and then photocopying the results onto vellum. While this method produces sharp, attractive images, alignment problems are unavoidable, as this detail shows.*

Massing Studies

Some new Mac software, developed by and for architects, attempts to go beyond merely automating procedures traditionally performed by hand. Since building environments exist in three dimensions, architects realize a great advantage in being able to study the massing of proposed design solutions in 3-D before drafting their plan and elevation views. Two new Mac software tools–*Schema,* developed by architects at Harvard's Graduate School of Design, and *NewStudio,* developed by graduates of UCLA's school of architecture–enable architects to construct complex, three-dimensional masses that can be viewed from any vantage point and manipulated for quick exploration of alternative designs (see Figure 3).

In *Schema* you create building masses by selecting solid objects from a palette of three-dimensional shapes. You can then freely manipulate edges and corners to produce curves and irregular shapes. *NewStudio* provides a palette from which you choose rectangular, elliptical, polygonal, straight-line, and other *design primitives.* These two-dimensional building blocks can then either be revolved or extruded to create solid shapes. Additionally, the program enables you to generate perspective, axonometric, or isometric projections (either as wireframes or with hidden lines removed) from designs in plan, front, and side views.

New Mexico architect Richard Nordhouse used *Schema* to explore ideas in the schematic-design phase of a proposed housing subdivision. "We studied relationships between the housing and the street by designing a few units in *Schema,* cloning the units and placing them along both sides of the street, and viewing alternative designs from many vantage points," explains Nordhouse. He then printed the best view of the best arrangement, traced overlays, and produced a rendering with colored pencils, pastels, and felt-tip pens.

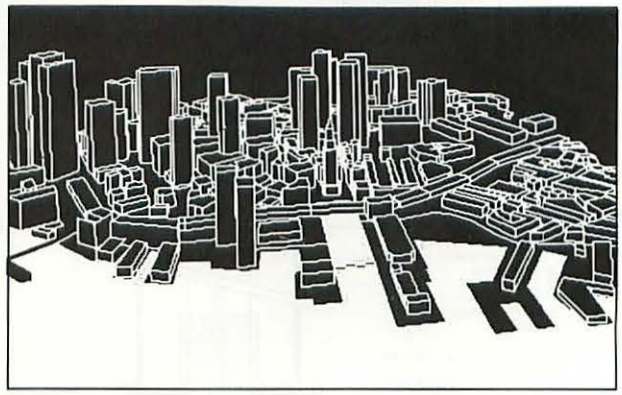


Figure 3
Architect Katherine Dillon used Schema *software to study the impact on the Boston waterfront of a proposed redesign of historic Customs House.*

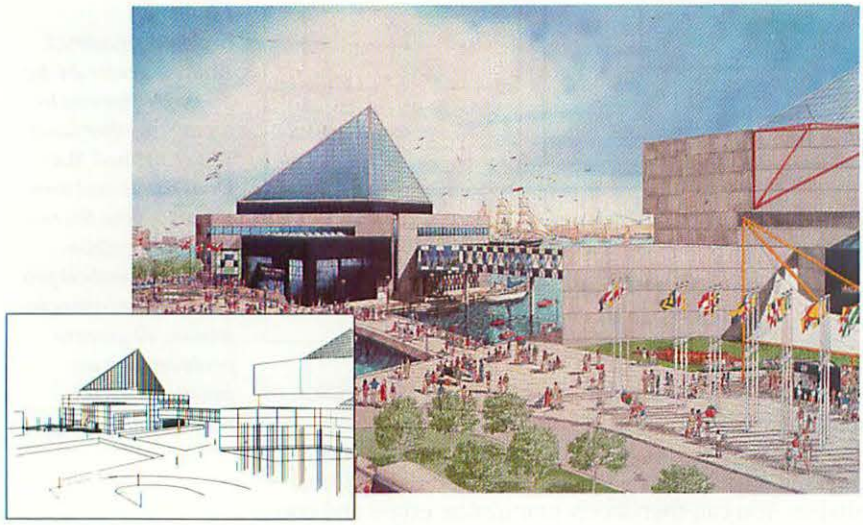


Figure 4
Isao Oishi uses MacPerspective *to construct the basic framework (inset) for his renderings, such as this one for the Marine Mammal Complex of the National Aquarium in Baltimore.*

Perspective Renderings

Beyond a rotatable view on the Mac screen, the next-best method for visualizing a building's shape is a perspective view. Production of hand-drawn perspectives is time-consuming and is traditionally undertaken only when a design is complete and ready for presentation. With the Mac, creating perspective views can be part of the design process. "I can generate one-, two-, or even three-point perspectives so quickly that I find myself using them to test out ideas from the very beginning," says Dennis Dornan of Field/Paoli Architects in San Francisco. "With *MacPerspective* I can model even quite complex designs in one or two hours and print out as many different viewpoints as I choose. This is valuable for keeping the client informed during the design phase of a job and getting feedback at the earliest time."

Architect Bob Senonson uses *SpaceEdit* to take this process one step further. Once he has settled on a design and perspective he likes, Senonson transfers the perspectives to *ComicWorks* for enhancements such as shading and shadows. "*ComicWorks* has an airbrushlike feature with incredible control over pixel density," he explains. Clip-art views of different tree varieties, available from MacGraphics, make it easy to add realism to Mac-generated perspectives. Senonson then uses *MacPlot* to output the resulting graphic on a line plotter. From the plotter output he makes a standard architectural blueprint and renders a high-quality presentation of the project design with colored pencils and felt-tip pens.

Albert C. Martin and Associates, a 200-person, 40-Mac architectural and engineering firm in Los Angeles, uses a digitizer to create quick renderings for presentations. Firm members create building studies in cardboard, photograph them, and then digitize the photographs with a scanner. When the architects present the models to clients, they pass out desktop-published descriptions that include the digitized images.

Baltimore architect and illustrator Isao Oishi uses Mac-drawn perspectives to produce elegant painted renderings of proposed building projects for internationally acclaimed architectural firms (see Figure 4). Oishi drafts as much detail as possible in *MacPerspective* (see *Reviews, Macworld,* November 1986), but he prefers to draw trees, people, and shadows by hand. He traces the hard-copy plotter output onto mylar tracing film using ink, colored pencil, felt-tip pen, and watercolor or airbrush. Oishi finds the fill patterns and line resolution of plotters generally unacceptable, but overcomes that problem by plotting large and then photographically reducing the drawing 25 percent. His artistic results command high prices from clients, who feature them in leasing brochures and display advertisements.

Even construction details and assembly procedures can be rendered on the Mac, with shade and shadow for improved informational clarity. Niles Nordquist finds that his high-resolution rendered perspectives of details are clear enough to replace several normal views (see Figure 5).

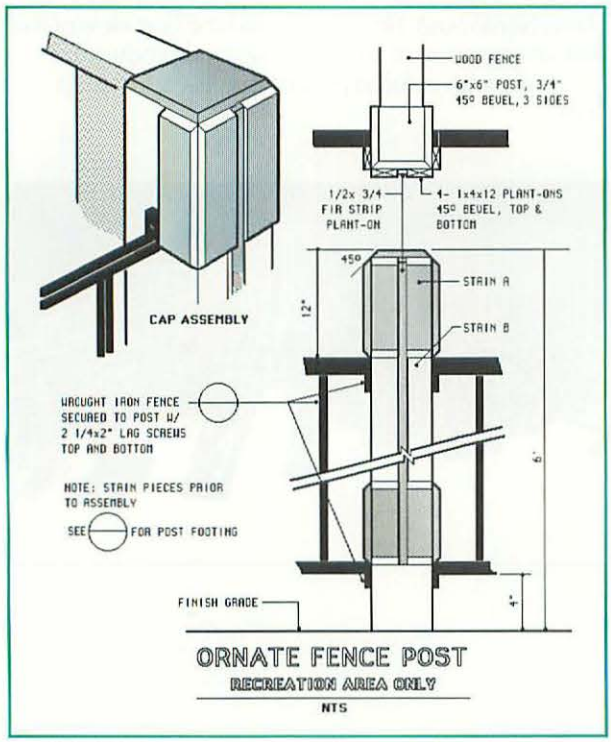


Figure 5
A 3-D construction detail produced with MacPaint. *Drawing by Niles T. Nordquist.*

Design Concepts

Many design decisions—such as the relative location, adjacencies, and grouping of activities or spaces—can be made before an architect draws specific sizes and shapes of rooms. While the Macintosh can't automate these conceptual design decisions, it can facilitate them.

At the simplest level, one can define a design problem based on client preferences, square-footage needs, building-site resources and limitations, available materials, and other program factors—with the help of standard word processing, idea outlining, and spreadsheet and database software. Architects at the internationally acclaimed firm of Cambridge Seven use Microsoft's *Multiplan* to massage a project's square-footage requirements until they conform to budget restrictions. Architects actually take a Mac into client meetings and run calculations until the clients' diverse and often conflicting interests are sorted out. At the meeting's end, the resolution is printed on an ImageWriter and distributed.

More sophisticated analyses of a building project—for example, the examination of pedestrian circulation patterns or the relationship of energy consumption to a building's orientation to the sun—can be performed on a Mac using simple *bubble* diagrams, diagram languages, or modeling software.

Specialty Applications

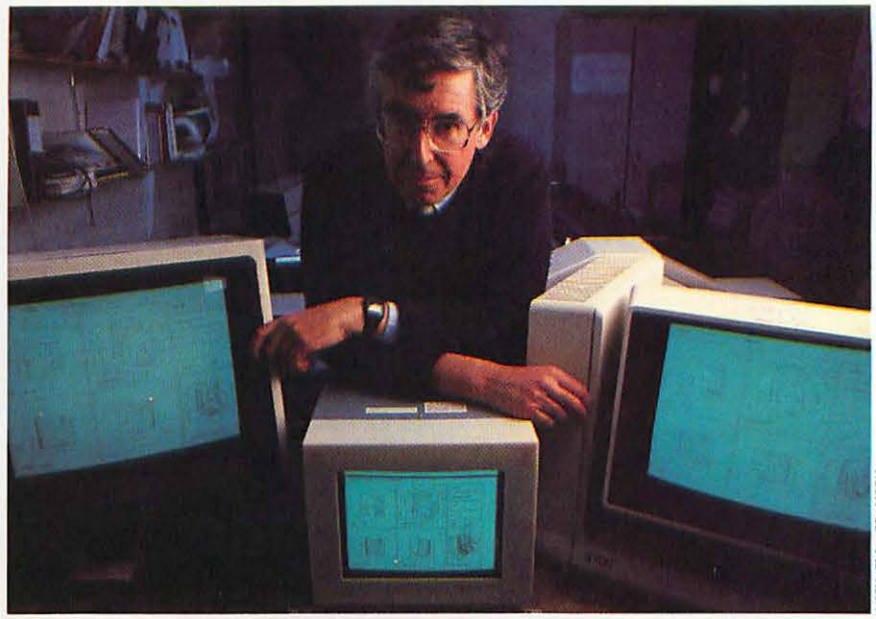
In addition to design and drafting software, architects use all the common Mac office tools. They plan projects with *MacProject* and *MicroPlanner;* they create brochures and environmental impact reports with desktop publishing software; they mock up signs; and they telecommunicate drawings to consultants, clients, contractors, reproduction services, and building sites. But alongside generic office tools, specialized support software designed for architects' needs is beginning to appear on the market.

ArchAccount, for example, is a customized package that handles tasks such as architectural project billing; job costing; and tracking of time-sheet data, expenses, project status, client payments, and project earnings.

Architects need more than *MacWrite* to prepare the detailed written specifications that must accompany a set of working drawings. *MacSpec,* from LM software, is a technical word processor that's designed to manage hundreds of sections and subsections on topics like joint sealants, material performance requirements, and interior finishes. The program lets you number sections hierarchically for sorting and accessing.

As a nice adjunct to *MacSpec,* the American Institute of Architects now publishes its MasterSpec documentation on disk. You simply call up standard technical specifications and incorporate them into your documents wherever needed.

Structural analysis programs like *MacFrame, Simple Span,* and *FrameMac* provide tremendous conceptual aid for architects. Such programs perform common beam- and column-structure analyses to determine sizes of structural elements—in wood, steel, or concrete, for example—for various fixed- and changing-load conditions. While these programs don't eliminate the need for a consulting engineer, they allow an architect to conceptualize efficient structural systems in the early design phases without waiting for an engineer's analysis.



MICHAEL L. ABRAMSON

Designing the Future

For the last decade, researchers at the University of Michigan have been developing an integrated program capable of taking a building from conception and design through construction and even demolition. Recently Professor Harold J. Borkin helped to port a major portion of this program, the 3-D geometric modeling module, from an Apollo environment to a Macintosh II—with gratifying results. The Mac II, pictured center, ran at least as fast as the Apollo workstations flanking it here.

The Future

As the Mac's early fans knew they would—and its hesitant enthusiasts hoped—the Mac's inherent strengths are now fulfilling their potential for architectural applications. The next step in the development of truly efficient CAD tools for microcomputers will be integrated programs that combine all the varied and interrelated activities of the design process in a single package.

Such products have been demonstrated in academia (principally in architecture schools at MIT, Harvard, Carnegie-Mellon, and UCLA), and companies like ComputerVision and McDonnell Douglas have offered some products for minicomputers and supermicros. Similar products for the Mac could be on the desktop within a year. The principal obstacle to all these efforts has been the lack of a common descriptive language that could represent design elements at all stages of a building's development, translating information from relational abstractions to spatial descriptions.

Developing an integrated package of this magnitude is an ambitious undertaking that extends beyond the automation of manual techniques into the realm of artificial intelligence. This path is an obvious one, however, for an industry that has already revolutionized the way we write, communicate, illustrate, publish, and even think. □

See *Where to Buy* for product details.

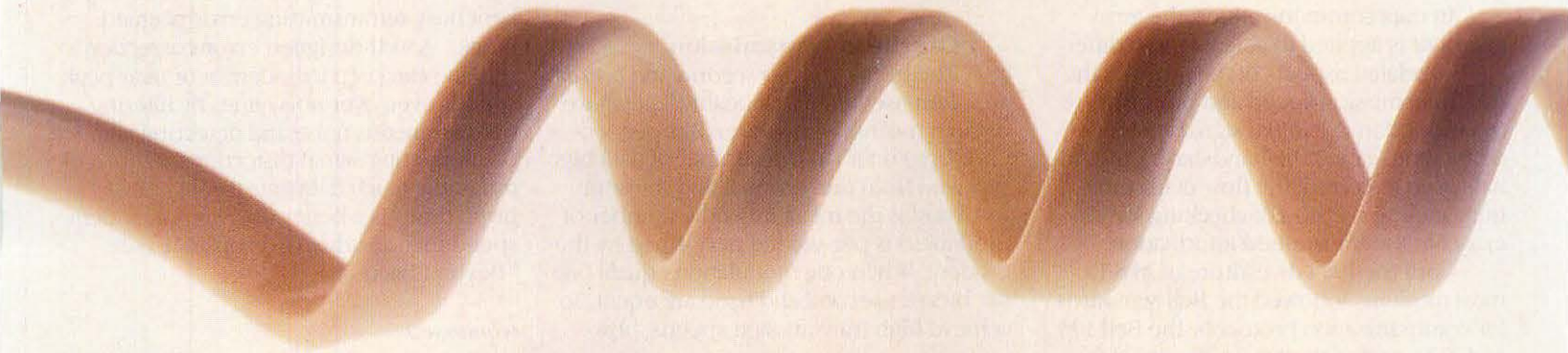


PHOTOGRAPHS BY FRED STIMSON

The Modem Marketplace

Fast and freewheeling or slow and steady? Tips for finding the right communications device.

by Nanci Hamilton



Speed seems to be the calling card for modem manufacturers these days: 300 bits per second (bps) is hopelessly old-fashioned. While 1200 bps is the current standard, available in reasonably priced modems, 2400 is hot on its heels—twice as fast and almost as cheap. The next logical step, 4800 bps, seems to have been skipped altogether; already 9600-bps modems are available for under $2000, and a modem costing less than $1500 that can communicate at nearly 19,200 bps over standard telephone lines has recently been introduced.

Files that would take several hours to send at 300 bps can be transferred in minutes at 9600. If you regularly send large files to distant places, you'll realize an immediate gain in productivity—accompanied by shrinking phone bills. But paying the price for high speed may not be the best choice. In this article, we'll present the features that set modems apart from one another, and see how nine modems on the market fit in.

The Speed Trade-off

If exchanging files is only a small part of the way you use a modem, speeds in excess of 1200 bps might be overkill. You can only type or read so fast, so standard 300/1200-bps modems are generally adequate for applications like calling a bulletin board system, reading electronic mail, or entering information into a remote database. Few, if any, information services or packet-switching networks currently support connections above 2400 bps.

Moreover, with faster modems the price you pay for speed could be more than the one on the price tag. Lacking the standards set for less adventurous speeds, you'll often have to send files without the error-checking safety nets set up for more sedate data transmission.

Three on a Match

Another consideration in picking a modem is its compatibility with other modems. For communication to take place between two modems, both must support the same data transmission rate and agree on communication protocols.

In data communications, the term *protocol* is applied to at least three different but related aspects of the process: the data transmission speed and properties (confirmed in the initial signals the modems send, called the handshake), the signals used to control the flow of information, and the method of checking for errors in the transmitted information.

Until the 1984 divestiture of AT&T, most modems followed the Bell standards for communication protocols; the Bell 103 and 212A protocols remain dominant for 300 and 1200 bps, respectively. After divestiture, when the 2400-bps modem came on the scene, manufacturers more or less universally adopted the only standard available: CCITT V.22 bis, from the Consultative Committee on International Telegraph and Telephone, an international telecommunications advisory organization.

At higher transmission rates, no single protocol rules. There are three technologically distinct types of 9600-bps modems: CCITT V.32-compatible, modified CCITT V.29, and proprietary nonstandard devices. Only the V.32 protocol is implemented in the same way across manufacturer lines. The V.29 scheme has been adapted in different ways by different modem makers, putting a wrench in compatibility. Modems that use V.29 and modems that incorporate proprietary technologies for high-speed communication can be used only with modems from the same manufacturer. So if you want a high-speed modem, it's important to find one that can fall back gracefully to 2400, 1200, or even 300 bps—speeds at which compatibility between different manufacturers' modems can be counted on.

The price you pay for speed could be more than the one on the price tag.

Overhead Transmission

The terms *bits per second* and *baud* are often used interchangeably. They have distinct meanings, however. Bits per second (bps) refers to the number of data bits received from the terminal and transmitted; baud is the measure of the number of modulations per second performed by the modem. When one modulation equals one bit, bits per second and baud are equal. To achieve high transmission speeds, however, a single modulation can convey several bits of information, and often the number of bits per second will be some multiple of the baud rate.

The more complex the modulation scheme, however, the more susceptible the signal becomes to distortion during transmission. To take account of the inevitable noise on telephone lines, error-correction features must be built into the communication process, either in software or in hardware. High-speed modems usually incorporate error-correction facilities within the modem itself, since hardware-based code can respond faster than independent software.

To check transmitted data for glitches acquired in transit, error-correction facilities at both ends of the line generate a number based on the data bits in each block of data sent. If the results of the independent calculations don't match, the system assumes that an error occurred in transmission, and the offending block is sent again.

A noisy line can slow even the fastest modem to a plodding pace as the device is kept busy retransmitting error-plagued blocks. A well-designed error-correction scheme can keep a modem at or near peak speeds even over noisy lines by filtering out extraneous noise and detecting and counteracting signal distortions. *Throughput*—how much data gets through in a given time—is a better measure of modem speed than an advertised bps rate (see "Beyond Baud").

(continues)

Manufacturer	Effective bps	Transfer Time (in minutes)
Migent	960	46.65
Novation	1840	23.82
Hayes	1866	23.48
Racal	6831	6.42
Fastcomm	7300	6.08
Telcor	7306	6.00
Codex	7666	5.72
Microcom	14,454	3.05
Telebit	17,265	2.53

Beyond Baud

The actual speed of a modem depends on more than its advertised rate of bits per second. The error-checking protocol and extras like data compression determine the actual throughput—the amount of original data that actually gets sent in a given amount of time.

Modems for Many

A high-speed, intelligent modem is an expensive proposition. For a stand-alone computer that communicates less than 10 percent of its working hours, $3000 for a peripheral may be a prohibitive cost. But if a modem—or several modems—could be shared by several computers, sophisticated communication becomes practical.

A modem server is software or hardware that allows several computers on a network to share a single modem. The server acts as a traffic coordinator; it accepts requests for the modem and either passes them to the modem or, if the modem is already on line, reports back to the user that the device is busy.

InfoShare's *ComServe,* scheduled for release in May 1987, is one such software package. Once the system is installed, users can access modems on the AppleTalk network much as they choose LaserWriters, using the new icon-oriented Chooser 3.0. After you select the modem you wish to access from the Chooser window, the system functions as if the modem were connected directly to your computer.

To receive files, you run communications software on your own Macintosh. If the modem selected is already in use, a "device busy" message appears. *ComServe* does not queue or spool requests, primarily because the Mac must be running telecommunications software in the foreground in order to command the modem properly.

The major technical issue in modem servers is the problem of passing characters, as opposed to passing blocks of data, across AppleTalk. Modem control is often dependent on recognizing one or two characters within the data stream (such as an XOFF character). Apple has announced its intention to define such a protocol, called a stream protocol, for AppleTalk. Until Apple's protocol arrives, *ComServe* implements a stream protocol developed and tested at Dartmouth College.

ComServe has been tested with most popular communications software and is not copy protected. There is no limit to the number of copies that can be made for network users, although the software requires that each server have a different serial number. The number of users and servers allowed per network is virtually unlimited.

ModemShare, a product of Mirror Technologies, is functionally similar to *ComServe.* The main difference between this product and Infosphere's is the stream protocol used; *ModemShare* uses a proprietary protocol. *ModemShare* has been tested and found compatible with common network applications such as *MacServe, Microphone, AppleLink,* and laser spoolers. Scheduled for release in June, the program will be bundled with a communications software package suitable for 1200- and 2400-bps communications.

While the software approach to modem serving requires that the shared modem be attached to an individual Mac, Solana Electronics and Abaton Technology offer hardware servers that let you attach multiple serial devices like modems, printers, and plotters directly to the AppleTalk cable. Solana's $595 C-Server attaches to the AppleTalk cable and has three serial ports through which you can connect three modems operating at 19,200 bps or less. Abaton's $699 MultiTalk also lets AppleTalk users access up to three 9600-baud modems.



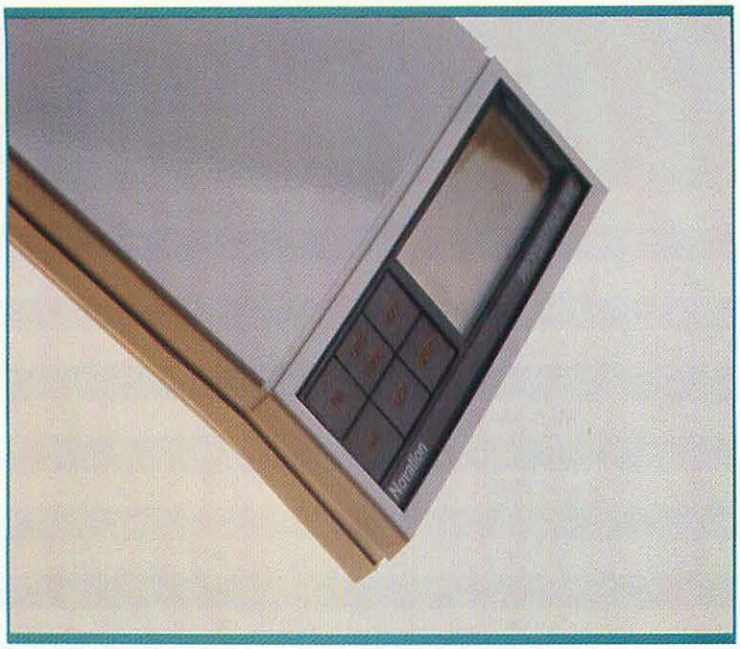
The Expected and the Extra

	Migent Pocket Modem	Hayes Smartmodem 2400	Novation Professional	Telcor Accelerator
BPS	1200	2400	2400	9600
Data compression				•
Compatibility				
Bell 103	•	•	•	•
Bell 212A/V.22	•	•	•	•
V.22bis		•	•	•
V.29				
V.32				
Duplex (half or full)	Full	Half and Full	Full	Full
Flow control				
XON/XOFF	•	•	•	•
RS-232C RTS/CTS	•	•	•	•
Phone handset connection	•	•	•	•
Leased-line connection				
Self-diagnostics		•	•	•
Command set				
Hayes AT	•	•	•	•
Proprietary		n/a		
Voice-to-data switching			•	•
Speaker		•	•	•
Power				
Battery	9-volt			
AC	110 VAC	120 VAC	110-130 VAC	115 VAC
On/off switch		•	•	•
Intelligent dialing				
Autodial	•	•	•	•
Autoanswer	•	•	•	•
Phone directory	•	•		•
Security features				
Password			•	Older versions
Callback			Optional	Optional
Error correction		•	MNP class 3	X.25 CRC
Dynamic baud-rate adjustment				
Interface	25-pin RS-232C	25-pin RS-232C	25-pin RS-232C	25-pin RS-232C
Dimensions	5″ × 2.5″ × 1.3″	1.5″ × 5.5″ × 9.6″	10.5″ × 5.5″ × 1.0″	1.9″ × 8.2″ × 10.0″
Cables included	Mac 512K			
Software included	•			
Price	$259	$899	$795	$995

The Expected and the Extra

The nine modems reviewed differ in more than data-transmission rates. In addition to finding the speed you need, check the protocols each modem uses for compatibility with other modems, and look for extra features included in the price.

Fastcomm 2496	Microcom AX/9624c	Racal 9600VP	Codex 2260	Telebit Trailblazer
9600	9600	9600	9600	19,200
	•			
•	•	•		•
•	•	•		•
•	•			•
Modified V.29	Modified V.29	Modified V.29		
			•	
Half	Half	Half	Full	Half
•	•	•	•	•
•	•	•	•	•
	•	•	•	•
			•	
•	•	•	•	•
•	•	•	•	•
	•	•	•	
•	•	•		
•	•	•	•	•
120 VAC	117 VAC	117 VAC	103-127 VAC	120 VAC
•			•	•
•	•	•	•	•
•	•	•	•	•
	•			•
		•	•	
EDI (proprietary)	MNP class 6	MNP superset	TCM (forward error correction)	CRC-16
•	•	•	•	•
25-pin RS-232C	25-pin RS-232C	25-pin RS-232C	25-pin RS-232C	25-pin RS-232C
9.5" x 6.35" x 1.4"	11.5" x 6.5" x 2"	1.5" x 8.0" x 13.3"	3" x 8.5" x 16"	2.25" x 8.63" x 12.75"
$999	$1799	$1495	$3495	$1445



Novation Professional
Although its top speed is 2400 bps, the Novation modem offers extra security and error-correction options. The LCD panel provides more information than the blinking lights common to most modems. It also communicates musically with its user during self-testing.

The efficiency of error-checking protocols depends on many factors. One is the size of the block in which data is sent. The smaller the block size, the less efficient, since proportionately more bits are sent for error detection and correction rather than for data transfer.

Modems can also lower overhead and increase throughput by using selective retransmission—resending only those blocks of data that included an error. This is far more efficient than nonselective (called go-back-*n*) retransmission, in which all data blocks beginning with the offending block are re-sent.

Whether a modem sends data asynchronously or synchronously also affects speed. In asynchronous transmission, start bits and stop bits are sent with each character to synchronize the transmitter and the receiver. In synchronous transmission, the receiver and the transmitter receive characters only at specified intervals. Start and stop bits are not necessary, which eliminates two bits of overhead for each character sent.

Xmodem and Kermit are the error-checking protocols used on most 300- to 1200-bps modems. Generally implemented in software, they use fairly large block sizes and half-duplex data transmission. (In half-duplex operation only one modem at a time can send information. Full-duplex operation allows a modem to receive confirmation of data received as it continues to transmit.) CRC-16, an error-detection algorithm, is an alternative protocol. It is implemented by individual manufacturers in many different ways, but the standard calls for larger data blocks to cut down overhead.

At high transmission rates, a confusion of incompatible protocols persists, but MNP, the Microcom Network Protocol, is making a place for itself. MNP varies data block sizes according to the conditions of the line and improves throughout with data compression. Microcom has defined six MNP error-correction classes, but only three are licensed to other vendors.

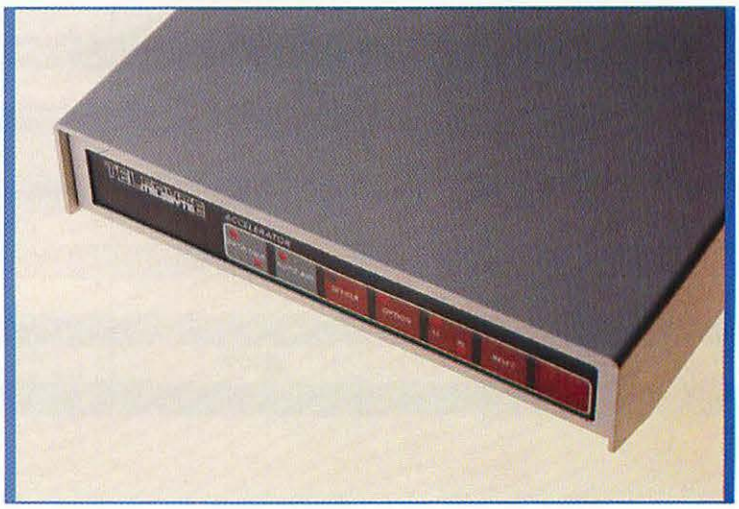
Extras

In addition to the many permutations of the basic factors discussed above, you should pay attention to extra features that may be important to you.

Security facilities, designed to prevent unauthorized access to a system, are important if sensitive or valuable data are stored on the computer. Password protection limits access to those who know the password. Callback is a system that ensures that access is granted only to systems located at authorized phone numbers. When a call is received, the modem asks for the caller's identification, then disconnects. The modem then looks up the phone number associated with that user and calls back. To defeat a callback system, potential intruders would need valid identification and would have to be located at the authorized phone number.

Communications software can automate your connection and transmission. To use such software, your modem must have a command set that the software supports. Most communications software is capable of issuing Hayes AT (Attention) commands and so can control any Hayes-compatible modem.

The more sophisticated the modem, however, the more likely specialized software will be required to use the advanced features effectively. Hayes's *Smartcom II* can only select rates of 300, 1200, and 2400

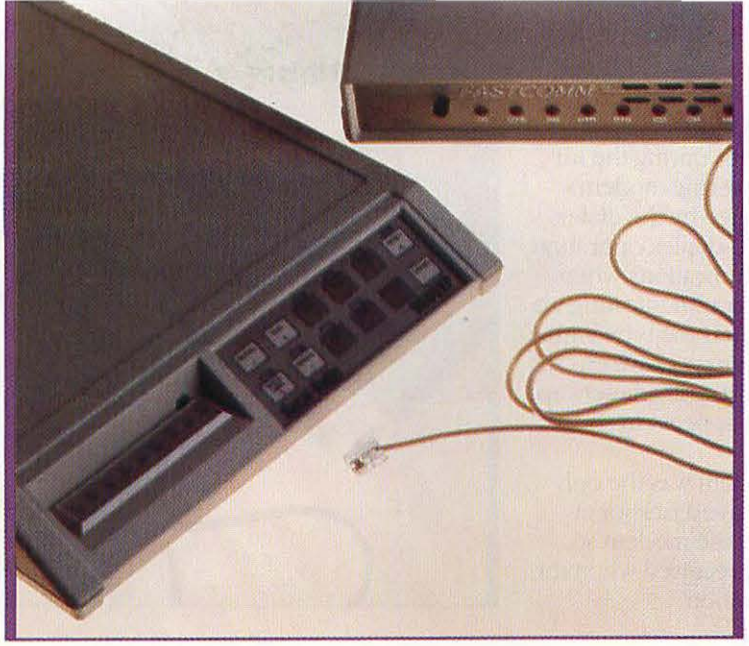


Telcor Accelerator
The Telcor's acceleration comes from a proprietary data-compression scheme that can boost its 2400-baud transmission to 9600 bps.

bps; it cannot support 9600-bps communication. *MacTerminal* is more flexible, allowing rates up to 19,200 bps, and *inTalk* from Palantir is designed especially for high-speed modem control.

Features like autodialing, autoanswer, self-testing on start-up, and LEDs to tell you how communications are proceeding have become standard on microprocessor-controlled modems. Check the variations on these features. If any are missing, it's an oversight to be noted.

Each of the nine modems compared here has unique strengths. The modems *Macworld* tested range from a $259 1200-bps model for those whose speed requirements are not extreme to a $3495 9600-bps number with all the extras. Within the field there's probably a modem that suits your needs.



Racal-Vadic 9600VP and Fastcomm 2496
Racal-Vadic's modem switches from full to half-duplex depending on line conditions. The Fastcomm unit operates in half-duplex only.

Migent Pocket Modem

The Migent 1200-bps modem is bright red and about the size and weight of a TV remote control. Either battery- or AC-powered, what it lacks in transmission speed it makes up for in-convenience. It comes complete with cables for either the Mac 512K Enhanced or the Macintosh Plus (no other modem tested did). It's also Hayes compatible, and will be bundled with Macintosh communications software. (At press time the package was being selected.)

The Pocket Modem has no hardware switches to set or configuration routines to run: just plug in the phone lines and the battery or the AC cord and it's ready to go. Configuration settings and one phone number and access code can be stored in nonvolatile memory. Error correction is accomplished via the communications software. At $259, the Migent Pocket Modem is an exceptionally inexpensive and convenient way to get on line. If you don't anticipate making large-volume data transfers and so can live with 1200 bps, this modem is an excellent choice.

Hayes Smartmodem 2400

The Smartmodem series from Hayes sets the standard among intelligent modems. The Smartmodem 2400 looks and acts very much like its 300- and 1200-bps predecessors, and supports those speeds. The 2400-bps modem has not substantially changed any of the commands in Hayes's command set, but has added several commands specific to the modem, including commands for controlling the speaker volume and the selection of synchronous and asynchronous modes.

In the future, Hayes will use a version of the CCITT X.25 packet-switching protocol to provide error correction at 2400 bps. Unfortunately, the X.25 specification leaves the implementation of some capabilities up to the ingenuity of individual manufacturers. Therefore, only transmissions between Hayes modems could be checked using that protocol.

Novation Professional 2400

The Novation 2400 is a 2400-bps Hayes-compatible modem. Like the Hayes, it is a solid and dependable 2400-, 1200-, or 300-bps modem. Advantages over Hayes and other plain-vanilla 2400-bps modems are mainly in the area of options: Novation offers versions that include MNP error correction and password and callback security features.

Novation's LCD display separates it from the other modems surveyed. The display, while more intelligible than the usual array of blinking lights, requires you to look downward at the modem to read it easily. When it is turned on, the modem automatically performs a six-step self-test with audible musical feedback (though this can be silenced by entering a command).

Telcor Accelerator

The Telcor (formerly Telebyte) Accelerator is a full-duplex 2400-baud modem that achieves 9600 bps using a data-compression technique. Throughput is dependent on the efficiency of the compression and varies from 6500 to 9600 bps. (The more random the data, the less efficient the compression. ASCII text, for example, compresses much more efficiently than nearly random binary data.) At press time, Telcor's error-correction scheme was a proprietary implementation of a CRC-16 protocol, but Telcor planned to release a version that incorporates MNP class 3 in June.

Telcor's acceleration can be turned off so that the modem operates at 2400 bps. The modem also supports communication at 300 and 1200 bps.

Fastcomm 2496

The Fastcomm 2496 is an asynchronous half-duplex 9600-bps modem capable of communicating at 300, 1200, or 2400 bps as well as using a proprietary adaptation of V.29. Fastcomm's error-correction technique is basically a hardware-based CRC-16 implementation that uses selective retransmission. The modem uses a superset of the Hayes AT command set.

The Fastcomm modem can switch a remote modem to the highest mutually acceptable data rate. If a 9600-bps modem calls a 9600-bps modem at 2400 baud, for

example, the answering modem can upshift the dialer to 9600 bps during the initial handshake. The answering modem's bps rate cannot be changed by the dialer.

The Fastcomm's half-duplex operation results in choppy communications when sender and receiver are communicating via keyboard. Much of the time you type without being able to see what you have entered, and then suddenly the characters appear. Received data also appears in short bursts of characters.

The Fastcomm modem was the only one tested that did not have a jack for attaching the telephone to the modem so that voice calls could be received when the modem was not in operation.



Codex 2260
Designed especially for communication in which speed is most important, the Codex 2260 is the only 9600-bps modem that offers full-duplex operation. Behind the front panel are five control keys.

Microcom AX/9624c

Darth Vader-like in appearance, the Microcom AX/9624c is a sleek, black, 9600-bps modified-V.29 modem that can also operate at 2400, 1200, and 300 bps. The AX/9624c incorporates MNP class 5, a data compression algorithm currently available only on Microcom modems. As with the Telcor compression scheme, the amount of compression achieved is influenced by the type of data being sent. The effective throughput can be dramatically increased, to an average of 14,000 bps.

Like Fastcomm's, Microcom's modems negotiate a mutually acceptable bps rate during the initial handshake. Also like the Fastcomm, the Microcom modem is limited to half-duplex operation at high speed.

There is no on/off switch on this modem; the power must be disconnected when the modem will be idle for long periods. The manual does not explain the hookup procedure very clearly, and the danger of frying the modem with an incorrect hookup is worrisome.

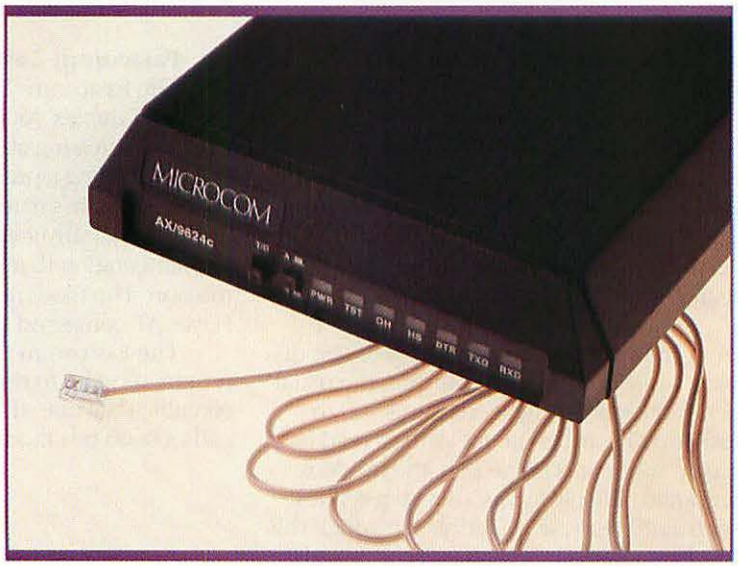
The Microcom modem uses a proprietary SX command set as well as the Hayes AT complement. Microcom's was the only modem tested that required access to hardware switches in order to configure it for operation with the Mac.

Racal-Vadic 9600VP

Racal's 9600-bps modem uses a proprietary technique to adapt V.29 technology. The dynamic duplex protocol allows full-duplex operation when interactive asynchronous data is being transmitted, and switches to a half-duplex link for high-speed transfers. This eliminates the jerky bursts of characters you must put up with during interactive communication using half-duplex-only modems such as Fastcomm's and Microcom's.

The front panel of the 9600VP is more elaborate than that of the other 9600-bps modems tested. It features a nine-LED status-indicator panel along with a ten-key keypad from which commands (such as phone numbers for dialing) can be entered. Modem commands can be issued using either the Vadic or Hayes AT command set. You can interrupt data communication and switch to voice (when arranging the details of a file transfer, for example) by pressing a key. As with the Microcom modem, there is no on/off switch: the modem must be unplugged to be turned off.

Error correction is provided using a superset of MNP class 3. In addition, the modem automatically adjusts transmission speed to balance error rates and data throughput. When errors occur the modem falls back from 9600 bps to 4800, 2400, or 1200, until the lowest error rate is achieved. When the error rate improves, the modem then increases speed in the same increments.



Microcom AX/9624c
Only Microcom modems can use class 5, the most advanced of Microcom's industry-honored data-compression algorithms, to push throughput past 9600 bps.

Racal's documentation, while not the most attractively presented, was by far the most complete of any of the modems tested. It clearly and lucidly describes the modem's features and how to use them effectively.

Codex 2260

The Codex 2260 was the only V.32 modem in the batch. In accordance with V.32, it supports full-duplex 9600-bps operation and falls back to 4800 bps. The modem has several features consistent with its orientation toward large-scale data communications applications: a leased-line phone-connection jack (in addition to the standard-line and handset jacks); an internal phone book that stores up to nine telephone numbers; password protection to prevent unauthorized changes to the modem settings; and line-quality monitoring capabilities via an externally connected oscilloscope.

Though many high-speed transactions are primarily asynchronous and so can be performed acceptably using half-duplex high-speed modems, the full-duplex capabilities of the Codex modem make it extremely attractive for interactive applications such as CAD.

Like the Racal modem, the Codex 2260 has a drop-down front panel that conceals a five-key keypad with which you can access an internal modem-control menu or switch the line to voice.

The Codex modem supports the Hayes AT command set as well as its own Codex Verbose command set.

Telebit Trailblazer

The Telebit Trailblazer can transmit and receive data asynchronously at speeds up to 18,000 bps (for an overall throughput rate of 14,000 bps) using a proprietary transmission and error-correcting protocol appropriately named PEP (Packetized Ensemble Protocol). How fast is this? In our test, we were able to send a 300K file in less than four minutes using the Telebit. The same amount of information would take nearly an hour to exchange at 1200 bps. The Trailblazer is also compatible with 300-, 1200-, and 2400-bps modems and will automatically shift to match the transmission speed of the remote modem during the initial handshake. At 1200 and 2400 bps, the Trailblazer can transfer data using Microcom's MNP protocol. Telebit has also added the Kermit and Xmodem protocols.

When in PEP mode, the modem continually monitors the line to determine if errors have been introduced into the data; if errors exist, the modem adjusts the data-transmission rate to compensate. Data transmission speed is adjusted downward in small increments (less than 100 bps) if errors are detected. These increments allow throughput to be maintained at the highest level possible, given the quality of the connection. Using the Trailblazer's setup program, you can even see a graph representing the quality of the phone line.

Like the Racal modem, Telebit uses an adaptive duplex technique. The modem operates in full duplex for interactive communication and switches to half duplex when communication is asynchronous.

The Telebit modem is easy to configure and operate as well as blazingly fast. It is Hayes compatible, and its proprietary command set is supported by *inTalk,* Palantir's communications software. A CRC-16 protocol with selective retransmission is used to ensure that data is received error-free.

Making a Choice

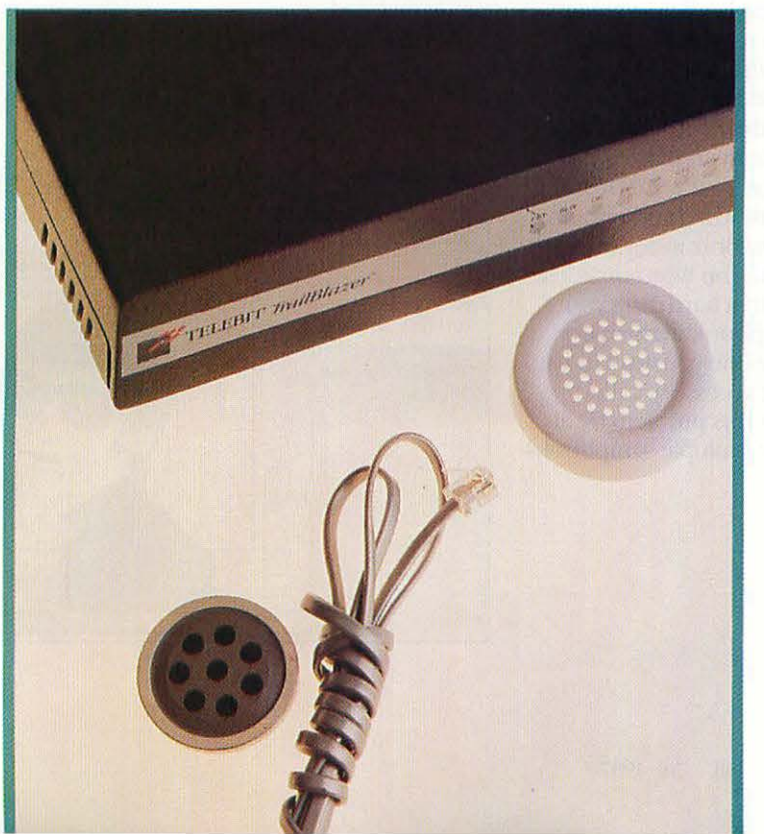
Because it is fast and easy to use (it's supported by *inTalk* and offers adaptive duplexing), the Telebit Trailblazer is probably the best value among the high-speed modems. The Microcom modem, which offers the closest approximation of Telebit's speed, is slightly more expensive, and its interactive operations at half duplex are less attractive. Racal's 9600VP has advantages, like good documentation and the ability to switch easily between voice and data, but it is comparatively pricey. Fastcomm's modem offers a weak selection of features at 9600 bps. The full-duplex capabilities of Codex make it the modem of choice for interactive graphics applications, despite its high price. Unfortunately, none of these modems can talk to any others at high speed.

At lower speeds, the Hayes and Novation devices are both excellent, well-supported modems compatible with all other standard 2400-baud modems. Novation offers a greater range of options, particularly in access control, and a lower price. It's the better buy unless you want the psychological security of owning the industry standard.

The Migent Pocket Modem is not powerful, but it is portable, convenient, and quite inexpensive. It fits easily inside a Mac's carrying case and does not require an external power supply. At 1200 bps it's a worthy entry, suitable for those with modest communications needs.

In making a selection, decide first what speed you need. Then weigh compatibility and price issues among the contenders. Whether you treat yourself to 19,200 bps and blinking lights or opt for a pocket-sized economy model, you're bound to find something just your speed.

See *Where to Buy* for product details.



Telebit Trailblazer
Although rated at 9600 bps, the Trailblazer uses a proprietary error-correction technique to achieve throughput rates of up to 18,000 bps. To communicate with less speedy modems, it automatically shifts to the transmission speed of its partner during the initial handshake.

Reviews

Scrap the Scrapbook?

***SmartScrap** 1.02 and **The Clipper** 1.01*

Cut-and-paste desk accessories. ***Pros:*** *Allow manipulation of Clipboard and Scrapbook contents.* ***Cons:*** *Take up a good deal of disk space (50K).* ***List price:*** *$59.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

As the popular aphorism states, "If it ain't broke, don't fix it." Solid advice. But if it ain't broke but ain't state of the art either, you might want to enhance it. The latter statement, much too wordy to become a popular aphorism, applies to Apple's Scrapbook. The Scrapbook, a serviceable desk accessory that stores a series of graphics or text "clippings," has finally been improved by *SmartScrap* from Solutions, Inc.

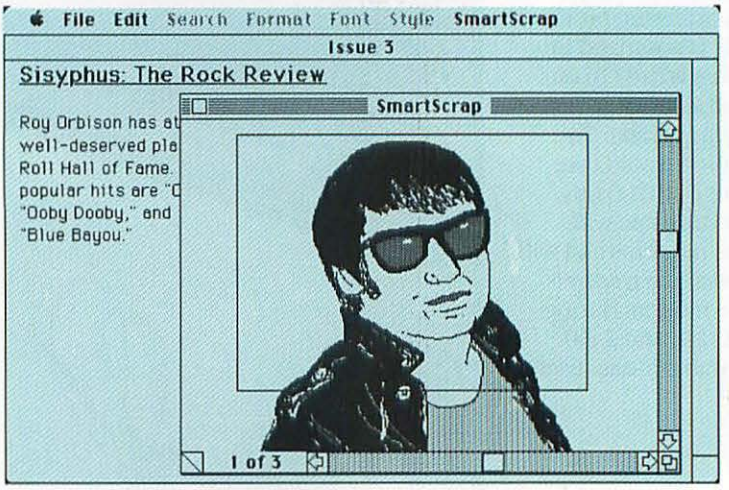
The Scrap Is Lacking

The standard Scrapbook has a number of limitations that most Mac owners have learned to live with. For example, a single Scrapbook is tied to a given System file; if you boot up with *Microsoft Word* and later need to paste in an illustration from the Scrapbook on your *FullPaint* disk, you'll have to quit *Word* and either boot up with *FullPaint* or transfer the *FullPaint* Scrapbook file to the *Word* disk. The situation is similar with a hard disk; you must replace the Scrapbook in the hard disk's System with the one you want to use. A public domain desk accessory called *Multi-Scrap* alleviates this problem by allowing users to create multiple scrapbooks on the same disk and choose among them. However, *Multi-Scrap* fails to address some of the Scrapbook's other limitations.

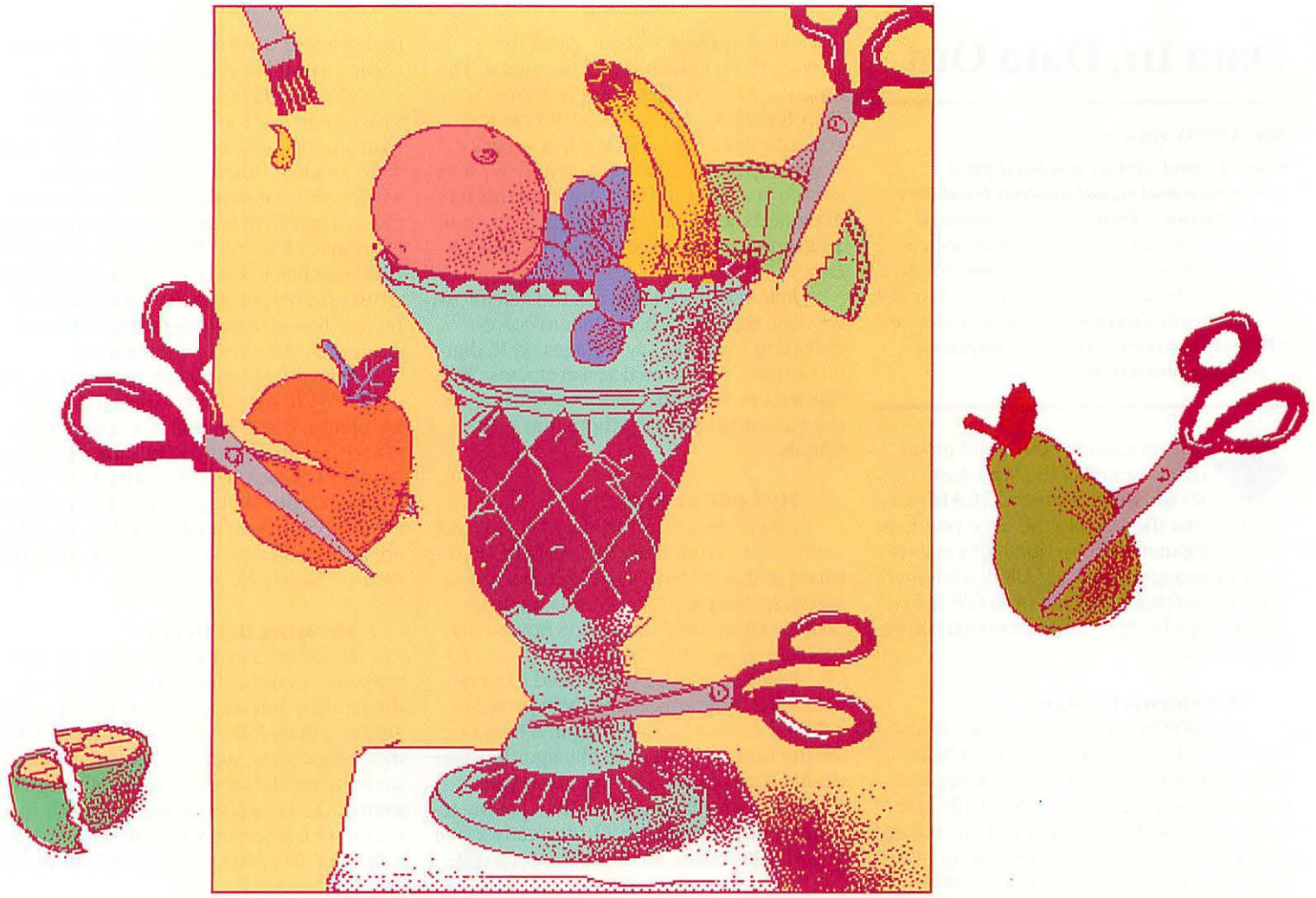
Another drawback is the Scrapbook's fixed size—a window approximately 2½ inches high by 4¾ inches wide. Although you can fit an item larger than this window into the Scrapbook, you can't view it as a whole, nor can you select a portion of the contents to paste. Finally, Apple's Scrapbook forces you to flip through its contents one entry at a time until you find the clipping you need.

SmartScrap solves the problems of locating, viewing, and selecting contents. It lets you create multiple scrapbooks, name them, and choose the one you need from a list. When you open a *SmartScrap* scrapbook, a scrollable, expandable window appears, allowing you to view a screenful of information at once, as well as move about a clipping that is larger than the screen area. Not only can you scroll to different sections of a text or graphics selection, but you can copy and paste selected portions as well (see "Souped-up Scrapbook"). For graphics items, a selection rectangle lets you choose part of a drawing, while a cursor lets you highlight and copy any portion of a text passage. (Note that when you select a portion of an object-oriented drawing, any object even partially within the bounds of the selection rectangle is copied in its entirety; this is not a *SmartScrap* flaw, but rather an inherent characteristic of object-oriented graphics.)

You view the contents of a *SmartScrap* scrapbook by clicking a dog-eared corner to flip from page to page. This method doesn't improve on the Apple Scrapbook's scroll arrow, but *SmartScrap*'s Table of Contents option does. When you



Souped-up Scrapbook
SmartScrap*'s scroll bars let you view large images, while its selection rectangle allows you to selectively copy and paste portions of an illustration.*



open a *SmartScrap* scrapbook, a menu title appears in the current application's menu bar. Show Table of Contents lets you see miniature, 1-inch-square versions of the scrapbook's contents in a scrollable window. You can then click on a picture to open that entry, instead of wasting time clicking from clipping to clipping until you find the one you need. This feature is no help with text clippings, but can prove very useful when a scrapbook contains numerous illustrations. To be fair, I should mention that *New Scrapbook,* a shareware desk acessory by Tim Wasko, (see *Macworld News,* in this issue) is similar to *SmartScrap;* but Solutions provides another handy desk accessory along with *SmartScrap.*

A Clipboard Companion

Solutions has also enhanced another essential Macintosh utility, the Clipboard. Apple's Clipboard serves as a temporary holding area for items that are being transferred from one application to another or from an application to the Scrapbook for permanent storage. Unlike the Scrapbook, the Clipboard can hold only one clipping at a time. A companion desk accessory called *The Clipper* enables you to trim or scale a drawing in the Clipboard before sending it to its destination.

The Clipper displays a transparent window that can be resized and moved about the screen. The window's dimensions can be displayed in pixels, millimeters, picas, or inches—whichever you prefer. In a typical scenario, you might overlay *The Clipper* on a column of text where you wish to paste an illustration, dragging *The Clipper*'s window to the proper width and height. You would then place *The Clipper*'s window over the illustration in the Clipboard and use the appropriate command—Trim or Scale—to make the drawing fit in the designated area while retaining its proportions.

Both *SmartScrap* and *The Clipper* streamline the cut-and-paste process. Anyone who needs to organize a large collection of clip art by category will find *SmartScrap* valuable. And many desktop publishers will appreciate *The Clipper*'s ability to crop and scale drawings before they're pasted into a document. Together these desk accessories take up about 50K of memory, but they improve upon the original Clipboard/Scrapbook duo. Amid the rush to produce The Most Amazing Desk Accessory, it's good to see someone improving those ordinary but indispensable utilities.—*Erfert Nielson*

See *Where to Buy* for product details.



ILLUSTRATIONS BY MARK ULRICH

Data In, Data Out

MacADIOS System I

Four-channel, 20-kHz analog/digital conversion and signal analysis hardware and software. ***Pros:*** *Versatility; advanced built-in analysis capabilities; user interface template for high-level function calls.* ***Cons:*** *Erratic physical quality standards; Mac user interface not followed strictly.* ***List price:*** *$2500; includes MacADIOS unit and sample programs.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

The processing power and input/output speed of the Macintosh should make it a wonderful laboratory tool. But the Mac has the same problem as any computer: getting digital information from an analog world. MacADIOS, a hardware and software package from GW Instruments, helps bridge the gap between nature and the Mac.

Waveforms to Digits

MacADIOS stands for Macintosh Analog/Digital Input/Output System, which sums up the functions of this science and engineering tool. MacADIOS rapidly and frequently checks the voltage of an analog waveform, such as sounds picked up by a microphone, and stores a series of numbers representing the voltage at each sampling time. You can use this information to recreate the waveform and display it on the Macintosh screen. You can also perform mathematical signal analysis on the numbers, either within MacADIOS or in another analysis application.

The unit has 8 differential analog inputs, 4 single-ended analog outputs, and 16 digital inputs and outputs; the analog lines all provide 12-bit resolution. Synchronization signals and power supply output are alongside the I/O channels on the front panel. According to GW Instruments, MacADIOS on a Mac Plus performed 17 seconds of sampling at 20,000 samples per second. While such numbers won't elbow an oscilloscope aside, MacADIOS has some special tricks of its own.

The MacADIOS package performs a sophisticated function–mathematical spectral analysis–based on the Fast Fourier Transform (FFT). By performing an FFT, MacADIOS can determine how much of a signal's power is at any given frequency, thus characterizing the signal. This function has a variety of applications. Security officers could use MacADIOS as the core of a voiceprint checker in a security system; speech pathologists could use it as a voice analysis tool. (GW Instruments has exploited the latter capability in a separate, $300 software package called *MacSpeech Lab.*)

MacADIOS can also ask the Macintosh for data, then turn that data into corresponding high and low voltages on 16 digital outputs, or into analog waveforms. With this feature you can specify waveforms on the Macintosh and turn them into actual signals.

My Code or Yours?

Part of the appeal of MacADIOS is that sophisticated functions are available on the board and don't have to be constructed in software. Simple function calls made by your programs tell MacADIOS how to manipulate signals and data.

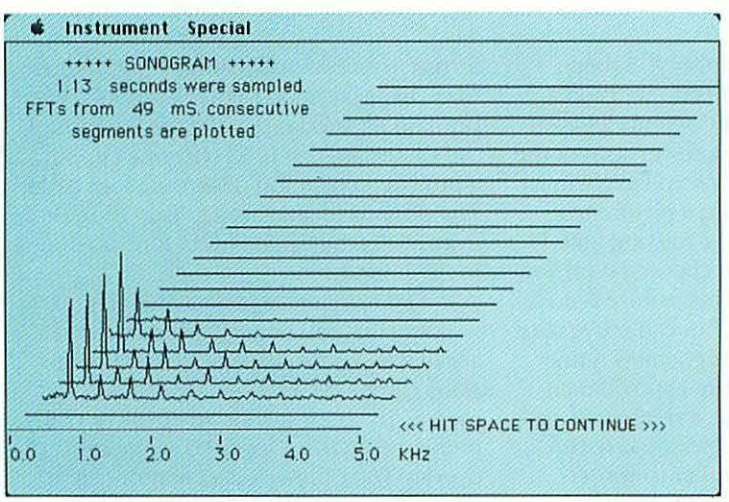
Chances are you won't need to write your own programs, thanks to a program called the MacADIOS Manager. A template for the function calls, the Manager lets you design automated experiments in MacADIOS's native language without having to program the Macintosh. Other ready-made programs emulate an oscilloscope, a voltmeter, a spectrum analyzer, and a chart recorder, as well as other instruments.

MacADIOS is not the only "virtual instrument" for the Macintosh. National Instruments sells a comparable $1995 software product called *LabVIEW,* which works with standard IEEE-488 instrumentation. *LabVIEW* requires an interface box (National's $595 *GPIB-Mac*) to connect the IEEE-488 bus to the Macintosh, and the instruments that send data on the bus must be purchased from other firms. These instruments often cost $1000 or more.

But while MacADIOS is less expensive than *LabVIEW,* it doesn't solve the same problems. The IEEE-488 is a high-performance, general-purpose bus for digital instruments; MacADIOS is itself a kind of instrument (albeit a limited one). MacADIOS and *LabView* have analogous functions but are not head-to-head competitors (see *Reviews, Macworld,* May 1987).

Sweating the Details

MacADIOS includes ready-to-go software, a commendable feature. However, the familiar Macintosh user interface is not always strictly followed. For example, File menu functions, such as Quit, are grouped under a Special menu in some of the programs. Occasionally messages appear in a corner of the screen when alert boxes are called for. In addition, MacADIOS fumbles



Harmonics and Harmony
An FFT from MacADIOS *analyzes a piano note. Each line represents one sample; time progresses from front to back. The leftmost peak in each line is the fundamental frequency; successive peaks indicate overtones. Other musical instruments would show different patterns for the same note.*

some of the finer points of Mac software craftsmanship. When alert boxes go away, for instance, they sometimes leave a white rectangle on the screen. You then have to issue a command to redraw the screen, something the software should take care of automatically.

Minor glitches aside, the common theme behind the user interface problems in MacADIOS is ambition, not deficiency. GW Instruments has put a great deal of functionality into a limited space, so the screens are sometimes confusing.

The MacADIOS hardware also exhibits some design deficiencies. The front-panel binding posts have no lock washers; several of them could be turned by hand, which could break wires inside. More technically significant was the fact that chassis ground was not predictably and conveniently available on the front panel.

The MacADIOS manual, though thorough, often lapses into "computerese," and clear overview sections are few and far between. A few oversights, like having a screen shot considerably different from the actual display, are also apparent.

The shortcomings of MacADIOS are fairly minor, however. The functions are there, ready to be put to work collecting and analyzing data with your computer, even if the polish one expects for $2500 is missing.–*Curt Ingraham and Joe Chew*

See *Where to Buy* for product details.

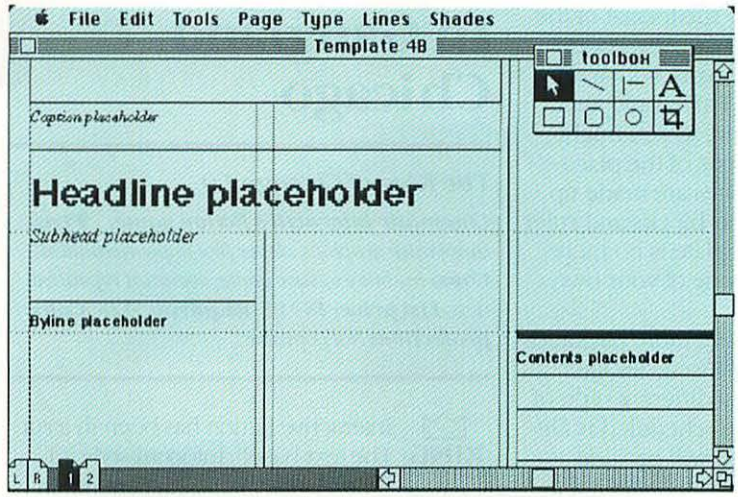
Losing the Newsletter Blues

PageMaker Portfolio: Designs for Newsletters

Newsletter templates with tutorial manual for* PageMaker *1.2. ***Pros:*** *Useful tips and tricks for newsletter design and layout; informative manual.* ***Cons:*** *Too few illustrations in the tutorial.* ***List price:*** *$79.* ***Requires:*** *512K.* ***Copy protection:*** *None.*



Aldus Corporation's *PageMaker Portfolio: Designs for Newsletters* is a collection of 21 templates for *PageMaker* 1.2 that's designed as a complete learning tool. So even if you haven't had any design experience, you're likely to find this package an invaluable aid. Created for Aldus by experienced publication designers, *Designs for Newsletters* is filled with guidelines, tips, and suggestions on a variety of layout fundamentals.



Three-Column Template
Template documents contain placeholders for elements such as captions, headlines, subheads, and bylines. This typical newsletter template shows several of PageMaker*'s column guides and rulers, which help in the placement of text and graphics.*

Learning Design Concepts

In this package the extensive manual is as important a component as the templates themselves. It covers everything from what you should consider when creating a masthead to such elements as the font, style, and spacing of the text; whether to include artwork, lines, boxes, or shading; and how to properly balance the size and placement of the newsletter's various components. The manual reviews the best combinations of typestyles for headlines and body text and recommends good font combinations.

You are shown how to create *spacing guides,* for controlling the space between design elements; how to make more room or take up excess space for articles that are too long or too short; and how to create *drop caps,* large initial capital letters that start a story or an important paragraph.

Ready, Set, Newsletter

The templates themselves range in complexity from simple two-column layouts to sophisticated five-column and varying column-width designs. Each one has a primary model and two alternative layouts at varying levels of difficulty. The manual describes each layout and provides helpful commentary on specific issues related to its use. For example, it notes where formats can be modified to fit individual needs and points out potential problem areas and how to address them.

The templates consist of ruler guides, to help you align the various objects in your newsletter; placeholders, to identify the placement, font, style, and size of text elements on the page; and ruled lines, to help visually separate sections (see "Three-Column Template"). The manual shows examples of how the newsletter appears when completed, what you might create in a short half-hour period (see "Finished Newsletter").



You can also modify the format of the templates for your own purposes. For example, you may prefer to work with a different selection of fonts. This would affect line and character spacing, so you might need to adjust the positions of the placeholders. Since the templates are made up of normal *PageMaker* text blocks and ruler guides, adjusting the template is no more difficult than modifying one of your own documents.

Aldus will be releasing more packages for the *PageMaker Portfolio* series later this year, each geared to a different type of publication. One of those scheduled is *Designs for Manuals,* which will provide guidelines and templates for producing a variety of structured publications such as instruction manuals, installation pamphlets, operation guides, and employee handbooks.

You should be reasonably familiar with *PageMaker* before diving into this package, since it covers many advanced concepts and techniques. Aside from the sparse illustrations in some of the step-by-step tutorials, I can't find much fault with *Designs for Newsletters*—it's complete, well done, and worth the price.—*Eric Alderman*

See *Where to Buy* for product details.


Computer News

July, 1987, Volume 1, Number 1

Macintosh Database Survey

by Steve Michel

WordPerfect: Number 1

WordPerfect Corporation soars to the top of the industry with a winner

by Eric Alderman

In this issue:

News tidbits 2

Aldus Corporation's announcements 2

Newsmakers: Interview with Rachelle DeStephens 3

Spreadsheet wars have begun to rage 4

Computer News 1

Finished Newsletter
After the masthead and headlines have been entered, articles poured in, and a graphic included, the result is a very professional-looking newsletter.

In Gangland Chicago

The King of Chicago *1.0*

Cinematic interactive fiction game. ***Pros:*** *Innovative graphics, clever plot implementation.* ***Cons:*** *Inability to save game, eventual repetitiveness.* ***List price:*** *$49.95.* ***Requires:*** *512K.* ***Copy protection:*** *Not copyable.*



KING

Interactive fiction has been in a rut. The text-based, Infocom-style adventures vary in theme, but retain the same tired technology. Mindscape's *The King of Chicago* delivers a game that comes one step closer to the computer entertainment dream: a real-time movie controlled by the user. In this movie/adventure game you see the characters move around, talk, and take action. (Actually, the actors here are animated cartoon drawings based on clay sculptures; the way they move their lips and blink their eyes is reminiscent of the vintage "Clutch Cargo" cartoons.) As in an adventure game, you control the protagonist, and choices you make at various decision points determine the outcome of the story. Different decisions result in different plots, and the program randomly changes characters' actions, so the same decision in one game may produce a different series of events in subsequent games.

This hybrid movie/game would not work at all if the dialogue sagged, or the graphics were handled poorly, or the limited multiple-choice questions you answer had no clear effect on the plot. But it does work, mainly because *The King of Chicago* is consistently entertaining. Game designer Doug Sharp has saturated *The King* with plot and characters that might have come straight from the great gangster flicks of the 1930s—protagonist Pinky Callahan tries to gain control of gangland Chicago while dealing with The Crafty Old Advisor, The Dumb Goon, The Flashy Moll, The Deadly Southside Rival, The Weepy Momma, The Crooked Alderman, and the Uncorruptible Cop Who Was Pinky's Boyhood Friend. Everything is handled with self-parodying wit and interchanges between characters are terrifically funny. I've never had so much fun playing a computer game.

Another surprise comes in your reaction to the game. The amount of cynicism required is prodigious. To do well as the would-be King of Chicago, you must put yourself in a mind-set that is as much Machiavelli as Frank Nitti. You must regard everyone as your enemy. For instance, if you try a little tenderness with your sweetheart Lola, your gang members might sense you are soft and plot against you. But if you're too mean to her, she'll betray you to your Southside rival. The unflinching ruthlessness of this game makes it unsuitable for small children and John Denver fans.

In other areas *The King* has some serious flaws. For instance, I find it appalling that a game that takes hours to complete won't let you save moves for later play. And although characters behave differently each time you play, eventually you find yourself watching some scenes again and again.

All in all *The King of Chicago* is an exceedingly amusing, if not overly cerebral, attempt at integrating the worlds of computer games and motion pictures.—*Steven Levy*

See *Where to Buy* for product details.

The Good and the Ugly

Maxwell 1200VP Modem with Communikit *1.0*

Modem and communications software. ***Pros:*** *Compact 1200-bps modem with front-panel lights and mode switches.* ***Cons:*** *Buggy, poorly designed communications program; doesn't work well under Hierarchical File System.* ***List price:*** *Modem $295; Communikit $79.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

Every great comedy duo has a straight man and a buffoon. A similar trend is surfacing in modem-and-communications software packages; however, the result isn't funny. Of the telecom combos I've used, the modems work well but (with the exception of those from Hayes and Microcom) the communications programs aren't worth the disks they're written on.

The Maxwell 1200VP and Communikit combo from Racal-Vadic is a case in point. The Maxwell 1200VP is a well-built, compact, Hayes-compatible modem. Communikit comprises a cable for the Mac and a disk containing *MacGeorge,* a cantankerous communicator.

The Modem

The Maxwell 1200VP is the better half of this duo. Since it's Hayes compatible, it works with all popular telecommunications programs. I used it with Software Ventures' *MicroPhone* without incident. Like the Hayes Smartmodem and Prometheus Products' Promodem–but unlike Apple's modems–the Maxwell 1200VP has front-panel indicator lights that keep you informed during a communications session. Moreover, the 1200VP has more lights than most, including some that indicate 1200- or 300-bps operation, and tell you whether the modem is in originate or auto-answer mode.

Unlike its competition, the Maxwell modem has front-panel switches that offer manual control. You can toggle between settings in several modes: 1200 and 300 bps, voice and data, originate and answer. The Loop switch puts the modem through a self-test routine. In most applications, your communications program controls the modem for you. Still, the front panel switches are a nice touch, and they come in handy if you're using the rare communications program that doesn't support the Hayes command set (see the April and May *Getting Started* columns for communications basics).

The 1200VP's other assets include a sleek, low profile (it's a mere 1¼ inches high), and a power switch, which some modems actually lack. And at a list price of $295, the 1200VP is more affordable than the premium-priced Hayes Smartmodem 1200.



Maxwell 1200VP modem

FRED STIMSON

MacGeorge

Anyone who wonders why *MacGeorge*'s icon looks like a dog hasn't used the program. A version of Aegis Development's *MacMail* that's licensed by Racal-Vadic, *MacGeorge* is an awkward hybrid of mailing-list manager and telecommunications program. It performs both tasks poorly.

The programmers based *MacGeorge*'s design on an electronic address book, perhaps on the assumption that telecommunicators have dozens of friends and associates with modems. (In reality, most people use one or two major information services.) *MacGeorge* allows you to enter names, titles (of less than ten characters), company names, addresses, and up to three phone numbers, one of which is a modem number. You can create a log-on card for each entry that includes simple macros for automatic sign-ons, but *MacGeorge* lacks a sophisticated autopilot facility like the ones in *Smartcom II, MicroPhone, Red Ryder,* and *inTalk.* It can print mailing labels for your address book entries, but you can't sort the entries before printing. *MacGeorge* does support the MacBinary file-transfer protocol, and it can emulate VT-52 and VT-100 terminals, although it doesn't display their function keys on the screen.

MacGeorge has a built-in text editor that lets you write messages for later transmission, but it limits you to messages of less than 500 characters. Type more, and you won't be able to see the extra text (there is no scroll bar). What's worse, when you try to save the message, the program crashes. *MacGeorge*'s other catastrophic flaw is its inability to work under the Hierarchical File System. Indeed, a Racal-Vadic representative admitted the firm doesn't even recommend its use on a hard disk.

MacGeorge is the worst telecommunications program I've ever used, but don't let that bias you against the Maxwell 1200VP modem. It's first rate. If you buy one, get a Hayes-compatible cable, and use *MicroPhone, Smartcom II,* or *Red Ryder.–Jim Heid*

See *Where to Buy* for product details.

Save That Disk!

1st Aid Kit *1.0*

Disk- and file-recovery utility. ***Pros:*** *Excellent documentation; easy to use; tutorial files provided.* ***Cons:*** *Not HFS compatible.* ***List price:*** *$99.95.* ***Requires:*** *128K.* ***Copy protection:*** *None.*

Disk repair software is like health insurance–you hope you'll never need it, but if you do, it's a real lifesaver. Until recently, there wasn't much you could do about those intimidating alert boxes that gravely announced, "This is not a Macintosh disk: Do you want to initialize it?" You were limited to cryptic tools like *Fedit Plus,* which gives you the power to change the information encoded on a disk byte by byte, a process that can do more harm than good if you don't know exactly what you're doing. It's a little like being handed a scalpel with license to perform open-heart surgery–unless you're a surgeon, the patient hasn't much chance of surviving. But now *1st Aid Kit* from 1st Aid Software is certain to

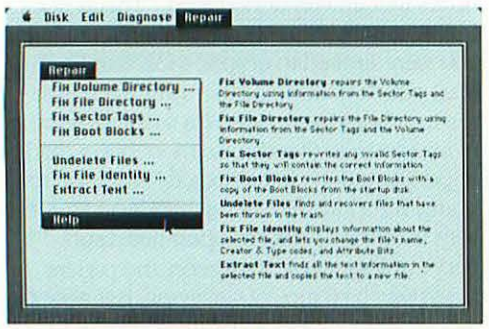
change all that. Designed to accommodate even the most inexperienced Macintosh user, *1st Aid Kit* is a disk doctor that diagnoses problems, offers suggestions, and then performs the surgery for you.

Version 1.0 is designed to work on single-sided (400K) MFS disks. Although some of the file-recovery features (such as the ability to extract text from a damaged file) will work on HFS disks, none of the disk-level repair procedures (like rebuilding the volume directory) are HFS compatible. But don't be discouraged if you're a Mac Plus user: 1st Aid Software has promised an HFS-compatible upgrade.

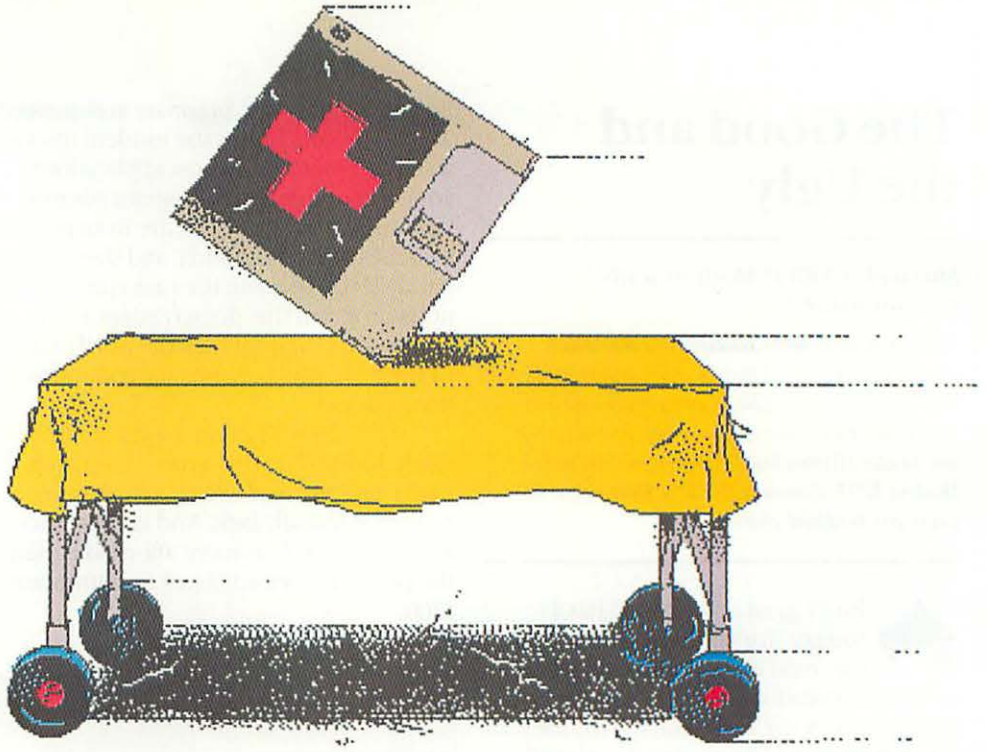
Even in its present version, however, *1st Aid Kit* is much more than a utility—it's really a reference manual accompanied by software, rather than the other way around. Comprising almost 300 pages, the documentation is accessible and comprehensive enough to appeal to any Mac user, for both avoiding problems and solving them when they occur. In addition to its problem-solving sections, *1st Aid Kit* offers three chapters of reference information describing how the Mac functions; how system, file, and disk errors are caused and resolved; and what precautions you can take to minimize operating glitches and data loss.

For Emergencies Only

Realizing that you probably won't be recovering disks and files every day, 1st Aid Software has made its manual and software very easy to follow—complete with much on-screen help (see "Help on Tap"). Also included are three disks of tutorial files for practicing diagnosing and recovery. The manual's eight-page introduction is all you need to start using *1st Aid Kit;* it explains how to use the lists of error messages, troubleshooting techniques, and recovery procedures that follow.



Help on Tap
Each of 1st Aid Kit*'s menus has a Help screen that explains the menu's options for quick reference.*



Covering every error condition imaginable, the error-message list is divided into two categories: Abnormal Behaviors (such as system crashes and printing problems), for which no written message is displayed, and Written Error Messages, errors for which the Mac does offer explanations. The Written Error Message List is divided into two groups—errors that require cross-references and those that don't. If your error message is in the cross-referenced group, you're led to the appropriate troubleshooting procedure. For example, the alert "Some files couldn't be read and were skipped" points to a section called "Some Files Were Skipped." There you find a list of six possible courses of action, logically ordered from simple suggestions (such as copying one file at a time or copying to a different disk) to more complex operations (like rebuilding the volume directory, an operation roughly equivalent to rewriting a book's table of contents, since the disk's volume directory tells the Mac where to find each file on the disk). The simple-to-complex order of procedures helps you quickly track down a solution and avoid unnecessary disk surgery.

The Doctor Is In

If the simpler suggestions don't work, you'll find a recovery procedure referenced in the next chapter. In this example, if rebuilding the volume directory were necessary, you would be directed to a section called "Volume Directory." Reading the recovery procedure is like consulting your doctor before an operation—you get a general explanation of the procedure's purpose, learn what "tools" are required (in this case, the *1st Aid Kit* software and a blank disk), and are warned of any possible side effects (thankfully, in this case there are none). As you're taken step by step through the procedure, you'll see screen shots of the alert boxes that will appear. Finally, a number of related references are listed for those who want to find out more about what was just done and why it worked (or didn't). I found the software ran without a hitch, and all the disks I recovered still work well.

How Important Is It?

There's no substitute for backing up important data. Nevertheless, because even the best-laid plans sometimes go awry, you should always be prepared to rescue a trashed disk or file. Although I highly recommend *1st Aid Kit,* don't expect it to work magic—if you've left a disk in your shirt pocket, chances are when it gets back from the laundry, nothing will recover it. But if it's fixable, *1st Aid Kit* can do the job. Those who use double-sided disks should keep a lookout for the HFS upgrade, which 1st Aid Software plans to make available at a reasonable price.—*Laurence Kirsch*

See *Where to Buy* for product details.

C Is for Complete

***Consulair Mac C** 5.0*

Macintosh software development system.
Pros: *Powerful, complete development system.*
Cons: *Editor, compiler, linker, and utilities are all separate applications; development-cycle time lost in transferring from one application to another.*
List price: *Mac C/Mac C Toolkit $425; Utilities $50.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

Over three years ago, while creating the Macintosh Development System (MDS) for Apple, Consulair Corp. bootstrapped Mac C 1.0, one of the most flexible C development systems available for the Mac. Although the current version resembles the original structure (an editor, C compiler/68000 assembler, and a smart linker), Consulair has improved the system. In addition to the exec application, which provides a simple batch-processing capability, and RMaker, Apple's resource compiler, the system now includes the Path Manager, the first and one of the more elegant HFS management systems. Consulair also has managed to double the overall speed of the compiler.

With the development tools Consulair includes a disk full of useful sample source code and a toolkit. The samples range from basic event demonstrations to a simple telecommunications program. The Mac C Toolkit is a library of useful routines, complete with source code for the tasks that are fundamental to most programs.

Compiler and Linker

The apparent simplicity of this C system belies its power. It provides a complete Kernighan and Ritchie implementation of the C language, as well as enumerated types, bit fields, and structure assignment. It also fully supports Apple's SANE floating-point package; a special version of the compiler is available for several floating-point hardware add-ons. The Mac C compiler also implements the Pascal function type, which lets you easily interface your code with some of the ROM routines, thus eliminating the need for assembly language "glue" routines. Should you require an in-line assembly language, however, you can use the Mac C compiler. In fact, the compiler is a fully MDS-compatible 68000 assembler that can generate 68000 assembly source code from a C source file as well as assemble MDS source files.

In addition to creating stand-alone applications, the linker provided with the Mac C development system is capable of producing driver and Defproc resources. The linker can also include an existing resource file in the final application, relieving you of the task of manually copying your program's resources. To minimize the size of the final code, the linker will remove any unused code from your application. The program supports symbolic debugging by generating a symbol map file. The linker also enables the programmer to create and manipulate library files.

To assist the compiler and linker in locating the many header and library files needed to create a final application, Consulair created the Path Manager, which turns the Mac into a truly HFS-compatible development system. The Path Manager identifies all the different types of files associated with creating an application (such as source files, header files, and libraries) and associates each type with a set of search paths. In other words, the Path Manager keeps track of which folder contains each of the different types of development files. The programmer has the option to set up each of the default search paths. The Path Manager then creates a special file that the compiler and linker consult when locating their various files.

Control Files

The programmer must create a file that tells the linker which files to include in the final application. An exec control file can automatically launch each of the applications and pass them the appropriate files. The edit-compile-link cycle is thus simplified to launching the exec.

Consulair offers a "Compile & Go" option to facilitate using the compiler without creating an exec control file. The programmer only has to ensure that the linker file is present, and the system will take care of invoking the compiler and the linker and launching the application. This makes things easier on beginners who may find creating control files a little confusing.

Utilities

To develop anything beyond a simple program and to maximize the efficiency of the Mac C system, you should consider a separate product, the Consulair Utilities. These four programming utilities include SuperMake, an intelligent *batch preprocessor;* Grep, a sophisticated text-pattern searching utility; Diff, a file-comparison utility; and the Maximum Performance Analyzer, an application profiler. SuperMake checks all the source files and creates an exec file that recompiles only files modified since the last time the program was built. SuperMake also frees the programmer from the chore of providing a control file to tell which source files make up which object files. By analyzing the object file after the application is first built, SuperMake can create its own dependency list to determine which files need recompiling.

Consulair's Mac C generates respectable code that's competitive with any Macintosh C compiler. Its updates are always timely, and its support staff boasts some of the most experienced Macintosh programmers around. The Mac C is a robust and proven system that can handle even the largest commercial project. Its documentation is lean and to the point and is not intended as a tutorial for the novice. Although it may be somewhat intimidating to beginners, Consulair puts all the pieces in place for intermediate and advanced programmers who must produce sophisticated applications.—*Jim Takatsuka*

See Where to Buy for product details.



Sound Choice

***Sound Lab** 1.1*

Waveform editor. ***Pros:*** *Greatly simplifies waveform editing and looping chores; unique features improve sound quality.* ***Cons:*** *Expensive—cost may not justify purchase. Documentation does not reflect changes in current version.* ***List price:*** *$399.95.* ***Requires:*** *512K, external drive, and special version of Mirage MASOS system software.* ***Copy protection:*** *None.*



Manipulating digital sound once required high-end computer keyboard systems costing up to $150,000. Recent developments in technology have brought the price of sampling keyboards, such as the Ensoniq Mirage, down as low as $1300. *Sound Lab,* by Blank Software, is an interactive visual editing system for the Mirage that makes precision work with sampled sounds relatively inexpensive.

Lights Out? Ready, Aim . . .

Sample manipulation on the Mirage's front-panel keypad is definitely a hit-and-miss process—like throwing darts at a target in the dark. *Sound Lab* solves this problem by drawing the sound sample or waveform for you and displaying the entire contents of the waveform memory for editing. Sounds can be copied, pasted, and inserted between markers (called *sound cursors*) that are placed within the sampled waveform. Clicking on the speaker icon plays the selected sound through the Mac's internal speaker or external speaker port.

The Mirage displays only one of 85 parameters or values at a time. *Sound Lab* allows many parameters to be displayed and changed simultaneously, and it maintains a link between the Mac and the Mirage so changes can be heard almost instantly. Sample looping is also simplified by the Loop Splice window, which graphically compares the loop start to the loop end in order to create a smooth transition (see "Loop Splice and Page Windows").

Snap, Crackle, Pop

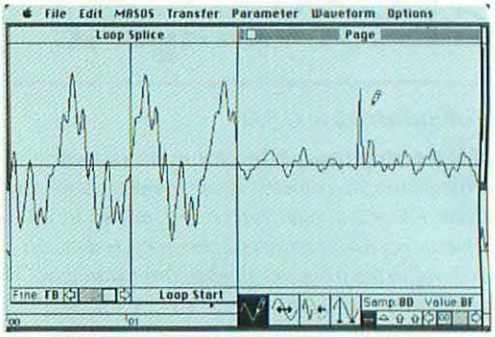
Many sampled sounds contain pops, clicks, or other forms of noise. Several unique features of *Sound Lab* allow for precise sample refinement. The Page window enables you to zoom in on one "page" (256 samples) of a sound and redraw the waveform using a *Macpaint*-style pencil.

Compression and 3 dBA liner fades are also possible with *Sound Lab,* so you can decrease unwanted volume changes within a sample and let sounds fade evenly in or out. A unique Interpolate feature increases frequency response by inserting a new "page" between every two samples in the waveform.

A Discouraging Word?
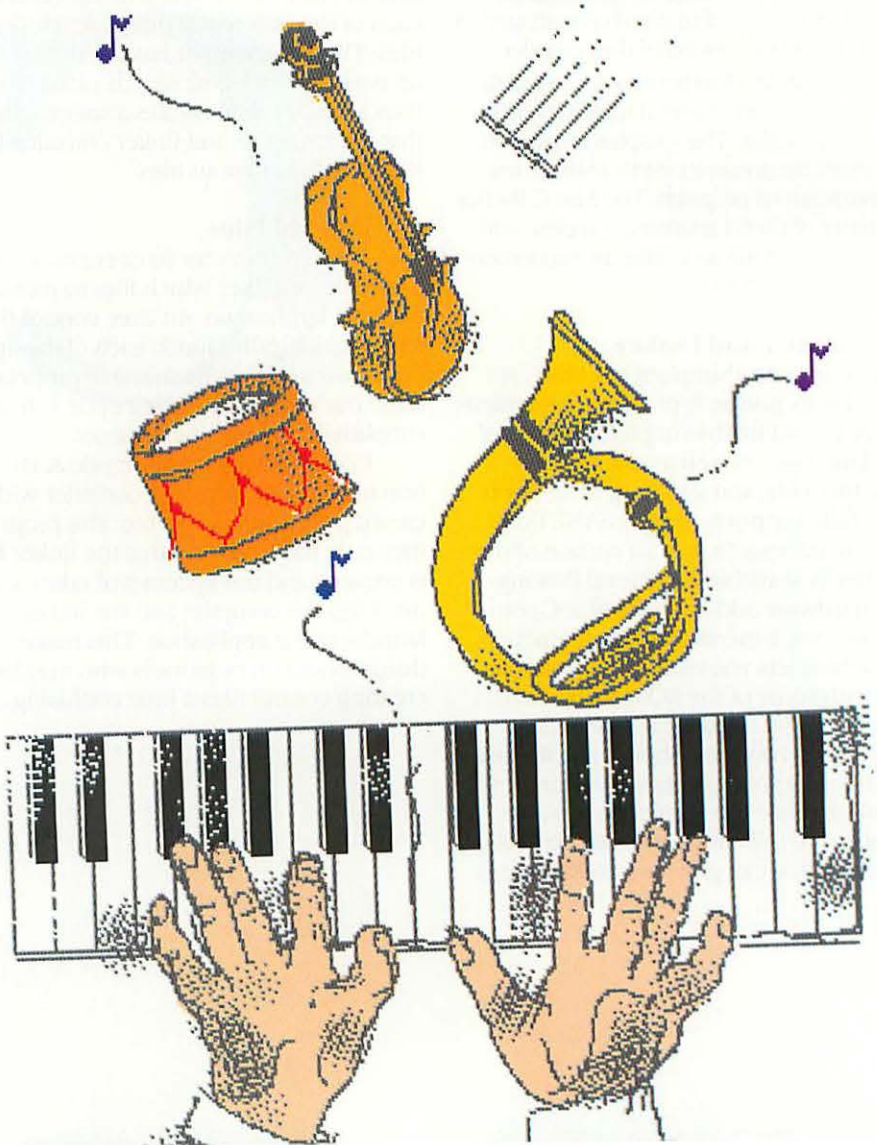
The documentation provided with *Sound Lab* is not consistent with the features added in the latest program update. *Sound Lab* is so complex that it requires a good deal of practice before the program is fully usable. Another shortcoming is that when waveform data is "cut," it is not saved on the Clipboard; this adds unnecessary steps to the manipulation process. Finally, if your computer activity is limited to working with sampled sound on the Mirage, you might consider lower-priced alternatives. There are Mirage editing systems for the Apple IIe and the Commodore 64 that, while not as fully featured as *Sound Lab,* do get the job done.

Still, *Sound Lab* can perform a variety of sample manipulations that greatly improve the versatility of the Mirage. Sample looping and parameter set-ups are much quicker, and sounds can be enhanced with the Page window and Interpolate functions. *Sound Lab*'s features and performance make it a good choice for those who already own both a Macintosh and a Mirage. *—Erik Holsinger*



Loop Splice and Page Windows
The Page window helps eliminate unwanted noises; the Loop Splice window enables you to create naturally sustained sounds.

See *Where to Buy* for product details.



Monday Morning Quarterbacking

Mac Pro Football

Football simulation game. ***Pros:*** *Incredibly realistic football simulation; very challenging; great value for the money.* ***Cons:*** *Requires knowledge of complex football strategy; play screens are too small; play calling involves too many steps.* ***List price:*** *$49.95.* ***Requires:*** *512K.* ***Copy protection:*** *Not copyable.*

NFL Challenge 1.02

Football simulation game. ***Pros:*** *Easy to use and understand; great animation, especially for play execution; well-designed screens.* ***Cons:*** *Doesn't fully use the Mac interface; uses only fixed plays; pricey, considering limitations.* ***List price:*** *$99.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*





Armchair quarterbacks will appreciate two new football simulation games for the Macintosh—but from different ends of the spectrum. While *Mac Pro Football* is geared for the serious student of the pigskin, *NFL Challenge* will appeal more to the casual fan who has less extensive knowledge of the game.

Mac Pro Football

Mac Pro Football, from the Avalon Hill Game Company, is to football what *Flight Simulator* is to flying—a realistic simulation that gives the user complete control. To benefit from this detailed recreation of the game, the user must have a firm grasp of play calling as well as offensive and defensive strategies.

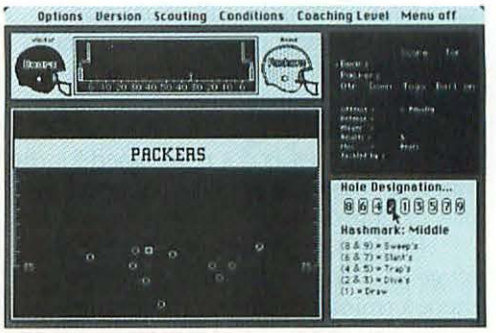
Avalon Hill provides a data disk with 39 championship teams, from the 1968 New York Jets to the 1985 Chicago Bears, sort of like a best-of-NFL-teams album. To set up "what-if" scenarios, you can schedule a match between any two teams on disk.

After selecting the opposing teams, you choose between playing the computer or a second player. The visiting team calls the coin toss, and the game gets under way. The screen then displays four windows: the first provides a scoreboard that indicates the down, yards to go, location of the ball, and time left on the clock; a second window keeps track of game statistics, such as attempts, completions, and yards gained; the other two windows show almost identical side views of the playing field, a rather useless duplication of effort.

Once the game clock starts ticking, you'll discover what really sets *Mac Pro Football* apart from the competition—its amazing flexibility. There are no fixed plays—as "coach" you choose among numerous variables to call either a passing or running play, designing pass-route patterns and setting distances and variables such as upfield yards and lateral movement. On most pass plays you can select from three different types of passing drop-backs: *straight, play-action,* or *rollout* (a fourth option, *shotgun,* is only available on third down and long). Before executing the play, you can call an audible at the line of scrimmage and switch to a run, if you have a change of heart.

When calling plays for the 49ers, I had Joe Montana execute a play-action pass to Dwight Clark. The pass route I designed had Clark run 20 yards upfield, cut laterally 5 yards, and run another 3 yards upfield. With running plays you have the same options for upfield yards and lateral movement, except that you must select a lane to determine the path your running back will take (see "Running the Ball").

On defense, *Mac Pro Football* maintains the same realism. You choose between a run or pass defense; select either a zone or man-to-man coverage to double-team your opponent's receivers; and set the defensive alignment to *tight, spread,* or *head-up,* depending on what kind of play you're expecting from the opponent.



Running the Ball
The lower-right window of Mac Pro Football's *play-calling screen shows the running lanes, which are numbered 1 through 9. To design a running play that cuts up the middle, you would choose lane 3, or for a sweep to the right, lane 9.*

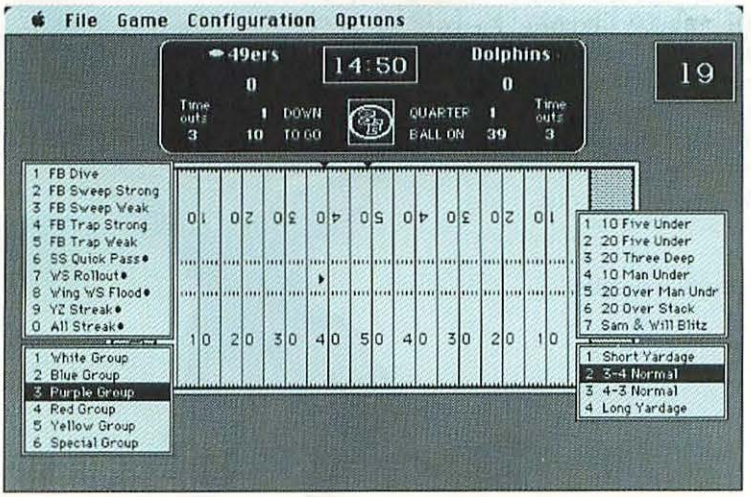
Play execution is swift, and you see the familiar chalkboard *X*'s and *O*'s as the lower side-view screen switches to an overhead view of the gridiron gladiators lining up. When the ball is hiked, you watch the play unfold as the *X*'s and *O*'s realistically traverse the field.

Along with its interactive environment, *Mac Pro Football*'s well-thought-out design, attention to detail, and authentic game simulation make it a worthwhile investment for any football fanatic.

NFL Challenge

NFL Challenge from XOR Corporation is a football simulation for the novice or casual follower of the game.

The *NFL Challenge* team disk provides the NFL's current 28-team roster, with



Calling the Shots
NFL Challenge's *well-designed, uncluttered screens make calling a play fun and effortless, even for rookies. Here, in the opening seconds of a game between the San Francisco 49ers and the Miami Dolphins, the 49ers have the ball on their own 39-yard line on first down and 10.*

each team's strengths and weaknesses based on the most recent statistics available. XOR also offers an optional disk of NFL championship teams.

Originally designed for the IBM PC, *NFL Challenge* was not redesigned for the Mac and doesn't offer much control over play calling.

Unlike *Mac Pro Football, NFL Challenge* has you coach from a playbook of predetermined passing and running routes. You choose your plays from six different offensive sets that together provide 40 different offensive formations. On defense, you choose from 39 defensive alignments. But *NFL Challenge* offers certain advantages over *Mac Pro Football:* primarily ease of use and better screen design.

When you start the game, you select a team and then choose one of among three different playing modes: the one-player mode, the two-player mode, or the computer versus itself (a nice feature, if you're a gambler). With a word processor capable of editing a text-only file, you can edit team rosters to customize your starting lineup. But be cautious; although substituting rookies for veterans and altering players' skill levels can enhance the game's appeal, this sort of operation is only for the serious hacker.

When *NFL Challenge* executes a play, you get an overhead view of the *X*'s and *O*'s moving down the field. At this point the program displays the playing field across the whole screen, rather than using only a small portion of it, as *Mac Pro Football* does. With *NFL Challenge* you get better play animation plus an instant-replay mode—a clever touch for a game emulating a televised sport.

If you're a rookie who's not yet ready to call the signals, you'll probably find *NFL Challenge* enjoyable and easy to use, although its limited use of the Mac interface doesn't give you full control. But if you're a veteran football fan who likes devising your own strategies with a minimum of guidance, then *Mac Pro Football* is your game.—*Ken Smith*

See *Where to Buy* for product details.

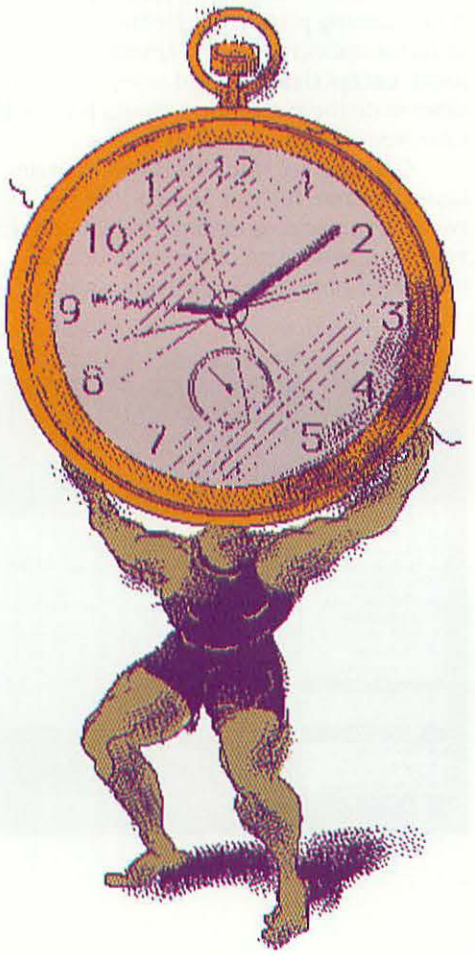
Tracking Mac Usage

***MacInUse** 1.0*

Time log for the Mac. ***Pros:*** *Easy to use, multipurpose. Fills a void in the Mac software inventory.* ***Cons:*** *Requires other applications to view or analyze its data files; cannot be used with desk accessories and some games.* ***List price:*** *$49.* ***Requires:*** *128K.* ***Copy protection:*** *None.*



Some utilities for the Mac—like menu clocks, print spoolers, or MiniFinders—work quietly in the background and perform specialized but important tasks. SoftView has just added another strong silent type: *MacInUse,* which measures the time an application is in use. Firms will find the program useful for developing productivity profiles or for tracking usage of office equipment. Consultants can use it as an adjunct to client billing, and home business usage can be documented for tax purposes. Since this time log can be set to work invisibly, it can also monitor unauthorized use of documents.



The Timekeeper

You install a working copy of *MacInUse* in each System Folder used to start up your Mac. (A hard disk requires only a single installation.) You can choose the disk to install it on, decide where to store the data file, and set four operation preferences. If you choose "invisible," you won't see it on the desktop or in the "Welcome to Macintosh" window. If you choose "visible," you have two other choices. You can "Allow installation override" to inactivate *MacInUse* until the next time you start up the Mac. Or you can choose to have a dialog box appear each time you close an application, asking you if the application was used for personal or business purposes. Judicious use of this dialog box gives you greater control later, when you need to sort or summarize the data file, for instance, by project or by client.

Once installed, *MacInUse* begins logging application usage time. Every new entry includes the name of the application, the date, and the time it was in use. One drawback is that you need another application to read the log (anything that reads ASCII files). Fortunately, SoftView provides you with templates for *MacWrite, Microsoft Word, Multiplan,* and *Microsoft Excel* to make this easier.

To use a template, you first make sure the data icon and template are on the same disk (or under HFS, in the same folder) as the application you're using to read the file. You double click the data icon and a dialog box appears indicating the available applications. You make your choice, and the data file is automatically pasted into the Clipboard as the application opens.

With *MacWrite,* you select Paste, and the data appears in plain text, tabbed to line up with column headings. With *Microsoft Word* the procedure is slightly more complex, but the instructions appear on screen within *Word,* so you'll probably get it right the first try (see "Standard Data File"). *Multiplan* works much the same way, but the *Excel* macro offers a more spectacular way to track Mac time. Once *MacInUse* has automatically opened *Excel,* you can instantly shift between the raw data file, a summary of the data, or a bar chart of the summary. You will often find the results surprising, even after a week of heavy Mac use. Upon opening the data file, you may be startled to find that it has

Application	Date	Start Time	Seconds	Duration	Purpose	Comment
MacWrite	9/6/86	7:49:01 AM	3288	0:54:48	Personal	Letter to Mom
MacPaint	9/6/86	3:09:44 PM	1015	0:16:55	Personal	Draw map to new home
Microsoft Excel	9/6/86	4:59:54 PM	1231	0:20:31	Business	Try new software
MacWrite	9/6/86	9:51:12 PM	146	0:02:26	Business	Letter to lawyer
MacWrite	9/6/86	10:16:03 PM	767	0:12:47	Business	Letter to accountant
MacPaint	9/7/86	2:56:29 PM	287	0:04:47		
MacInTax	9/8/86	4:08:02 PM	556	0:09:16	Business	Load last year's forms
MacInTax	9/8/86	4:19:18 PM	516	0:08:36	Personal	Show Mom how todo taxes
Microsoft BASIC (b)	9/8/86	4:38:44 PM	2291	0:38:11		
Microsoft Excel	[illegible]	9:34:05 PM	[illegible]	0:17:48	[illegible]	Cost estimate for Mesa pro
MacPaint		7:42:12 [illegible]				Cover [illegible] proposal

Standard Data File
This file was printed with the Microsoft Word *template included on the* MacInUse *disk. Purpose and Comment columns are optional.*

grown to hundreds of entries involving dozens of applications. Using the *Excel* macro—or better yet, a full-featured database manager—you can quickly sort and summarize the data file.

Limits in Use

Unfortunately, *MacInUse* will not track every application, as stated in the manual. Games that automatically restart or make unadvised uses of memory won't work. Programs that allow transfer between applications without returning to the desktop, as in *Switcher,* cause inaccurate tracking. Desk accessories do not track independently, and the Finder cannot be tracked.

By the time you read this, however, *MacInUse* version 2.0 should be available. Changes will include the ability to track separate applications under *Switcher* and to set the minimum time an application must be open to be tracked. Desk accessory times will be logged under the application open when they're used. Of interest to network users, *MacInUse* 2.0 will be compatible with *AppleShare* and *MacServe,* so you'll be able to track remote Macs from the central unit.

I've used *MacInUse* for three months, and its operation has been bug free. I'd like this product even better if it tracked games and desk accessories. Still, I consider *MacInUse* one of the most useful utilities for my Mac. In fact, the only people who won't have a use for *MacInUse* will be those who don't want to admit how they spend their time on the Mac.—*Scott Beamer*

See *Where to Buy* for product details.

Apply Yourself

MacMathPac *1.1*

Numerical analysis package. Pros: *Fast and accurate, with an extensive selection of functions.* ***Cons:*** *Inconvenient error reporting.* ***List price:*** *$185 (20 percent educational discount available).* ***Requires:*** *512K.* ***Copy protection:*** *None.*



There are three basic types of microcomputer programs currently used to automate math functions. Accounting and business packages automate simple arithmetic operations. On a more advanced level, packages such as BrainPower's *PowerMath* use artificial-intelligence techniques to aid in symbolic mathematical manipulations. In the middle range, applied math programs use actual numbers instead of abstract symbols to solve problems of numerical analysis.

MacMathPac, from Advanced Logistics for Mathematics and Science, is the first stand-alone applied mathematics package for the Macintosh. The program provides a complete set of operations for use in any field of numerical analysis. *MacMathPac* solves math problems in 10 different areas by means of 65 integrated program modules. The available functions range from simple equations to special functions used only in engineering and higher mathematics (see "Math Power Tools").

Operation Operation

MacMathPac comes on two disks, but currently you must use a launch facility to transfer between modules on different disks. Advanced Logistics says it plans to release a more integrated version in the near future. To use *MacMathPac,* you request a specific operation from the menu and then enter any required information—such as the equation to be integrated—via dialog boxes. When you're finished, the program

Math Power Tools

Contents	Typical Applications
Algebraic systems	matrix operations, linear equation solutions, eigenvalue calculations
Roots of equations	bisections, Newton-Raphson, nonlinear systems, cubic splines
Ordinary differential equations	*n*th-derivative, partial-derivative, initial-value problems, boundary-value problems
Graphing	two- and three-dimensional function plotting
Integrals	trapezoid rules, adaptive quadrature, Gaussian quadrature, double integrals, multidimensional integrals
Statistics	simple statistics, correlations, polynomial fitting of data, statistical distributions
Optimization	simplex, conjugate-gradient multidimensional minimization, Wolfe quadratic optimizations
Partial differential equations	parabolic heat equations, hyperbolic wave equations, two-dimensional Poisson equations
Series operations	power series
Special problems	complex powers, Fast Fourier Transforms (FFT), inverse FFT
Special functions	Legendre, Bessel, Chebyshev, Laguerre

calculates the result and displays it with the specified precision. *MacMathPac* calculated the following equation–integrate: e-xsin(x) from 0 to infinity–in only a few seconds by using the Gaussian quadrature method to produce the numerically correct answer, 0.5.

MacMathPac makes use of the Standard Apple Numeric Environment (SANE), which provides an 80-bit extended data type. This results in numerical values that have 19- to 20-decimal-place accuracy. You can round off the results to any level of accuracy you want.

Many of the programs in *MacMathPac* accept text-only data files, created either by external programs or by other program modules within *MacMathPac*. These files could contain data for statistics operations or for curve-fitting programs, for example.

The Final Analysis

The only criticism I have of *MacMathPac*'s operation is that it uses SANE error-code numbers in place of English error messages. Looking up error codes in the manual is an inconvenient and unnecessary step. Advanced Logistics says the upgrade–which may be out by the time you read this–will have improved error handling.

The documentation provided with the package is complete and guides the user through each menu possibility with sample problems and solutions. In addition, the manual contains a list of references for all of the techniques included in the package–a nice feature that enables you to check the assumptions underlying an analysis technique.

MacMathPac is by far the most complete numerical analysis program available for the Macintosh. It's fast and well implemented except in its use of SANE error messages. The package will be a useful digital companion for scientists and engineers who perform numerical analysis. In addition (especially considering its attractive educational discount), the package will make a most useful laboratory for students taking numerical analysis courses, a required part of most computer science programs.–*Terry Ward*

See *Where to Buy* for product details.

3-D CAD

Space Edit *1.5*

3-D graphics program. ***Pros:*** *Versatile CAD functions; fast generation of drawings; variety of viewing options.* ***Cons:*** *Large number of cursor icons for different functions; long learning period required.* ***List price:*** *$625.* ***Requires:*** *512K, external drive.* ***Copy protection:*** *Key disk.*

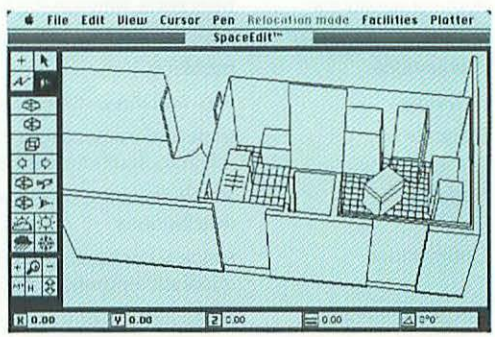


As its name implies, Abvent's *Space Edit* lets you create and modify graphics in three-dimensional space. While *Space Edit* could stand alone on the basis of its 2-D CAD functions, the program's real strength lies in the speed and versatility of its 3-D drawing tools. The program is aimed at the CAD professional rather than at the beginner; newcomers to computer-aided design would do well to learn the fundamentals with a program such as *MacDraft* before tackling *Space Edit*.

Space Edit's line drawings could be appropriate for architects, interior designers, or urban planners who want to show numerous views of building layouts. The program could also be used by industrial designers to create exploded views of machine assemblies or subassemblies. Features such as text, dimension lines, and scaling make *Space Edit* a candidate for architectural or mechanical illustrations. The program is less appropriate for graphic artists, since it doesn't provide shading; however, *Space Edit* illustrations can be copied to *MacPaint* or *FullPaint* and enhanced with those programs.

Creation, Modification, Visualization

When you boot up *Space Edit,* you'll see a familiar Mac screen layout: a tool palette on the left and a string of menu titles across the top. But at the bottom of the screen is a "geometry bar" that provides continuous digital readouts of the cursor's position in all three axes of three-dimensional space.



Room to Move

Space Edit *allows designers not only to define a viewing perspective but to rapidly animate a series of views, creating the effect of "moving through" a drawing. The viewer could zoom in on this interior, for example.*

Space Edit divides its tools into three categories: creation, modification, and visualization. Each category has its own tool palette, which is entered by clicking on an icon. Unfortunately, the program goes overboard in its use of icons; in addition to 55 icons in the various tool palettes, there are 29 cursor shapes, each with a distinct function. While the developers undoubtedly thought that heavy use of icons would simplify *Space Edit,* actually the opposite is true. In many instances the familiar arrow cursor would be preferable to the often obscure icons that pop up.

Like many 3-D drawing programs, *Space Edit* presents a drawing in four views: top, front, side, and axonometric. Unlike those programs, though, *Space Edit* allows you to draw in the axonometric view as well as the other views. A modification made in one view is reflected in the other three, allowing the designer to visualize the object in three-dimensional space. *Space Edit* offers a good deal of flexibility when you're drawing in four views. For example, you can "untie" the windows if you want to draw in only one. This not only speeds up the redrawing time but also lets you assign a different scale to each window if you wish.

Special Effects

A drawing may be viewed from various angles and distances. True perspective with three vanishing points can be achieved with a few commands, as well as perspective with two vanishing points or with no vanishing point (axonometry). Once the perspective has been set, you can produce some striking animation effects for presentations. Use the Rotation command to make an object appear to move in space, or the Path of Visualization feature to simulate the viewer following a path through a scene (see "Room to Move"). *Space Edit*'s quick screen regeneration produces smooth animation effects.

Another impressive viewing option is *Space Edit*'s *heliodonic* view, which simulates a perspective view along the sun's axis according to the season, the latitude,

and the time of day. When you enter information for a particular time and location, the program shows which part of a structure would be in shadow and which in sunlight under the specified conditions. This feature could help architects, urban planners, and builders planning to make use of solar energy.

Output

Space Edit supports the LaserWriter, the ImageWriter, and several pen plotters. The program generates vector-based documents in real size on the screen; scaling is done when a drawing is output. A unique algorithm calculates the intersections of vectors on the x-, y-, and z-axes, resulting in true hidden-line removal. Vector processing and hidden-line removal for plotting are normally slow operations, but *Space Edit* performs these calculations surprisingly quickly.

Space Edit's manual provides an easy-to-follow tutorial and thorough instructions on using each command. Despite the detailed instructions, however, *Space Edit* is not a program that will be quickly learned by newcomers to 3-D graphics. Familiarity with *MacDraft, MacDraw,* or another 3-D program helps, but even so, figure on a learning curve of 20 to 30 hours before you can take advantage of *Space Edit*'s many features.

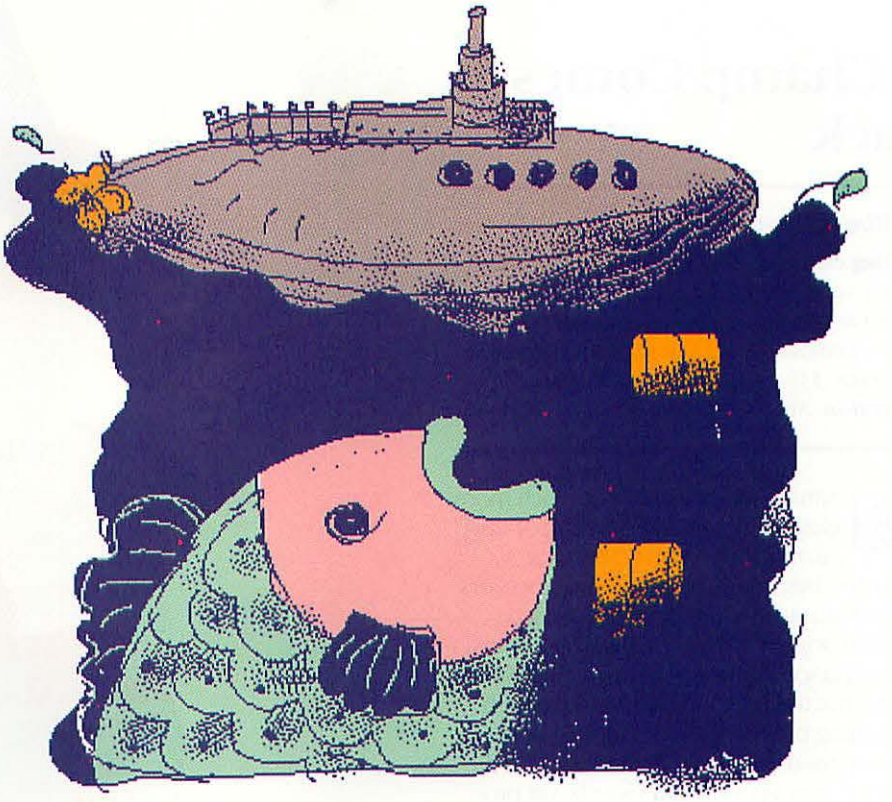
According to Abvent, version 2.0 of *Space Edit* will provide multiple fonts, a variety of dimension line styles, and color support for the Mac II.—*Chuck Carroll*

See *Where to Buy* for product details.

Dark Waters, Deadly Seas

Sub Battle Simulator

Submarine simulation game. ***Pros:*** *Brilliant historical replication of WWII sea-battle conditions.* ***Cons:*** *Not fully HFS compatible.* ***List price:*** *$39.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*



The Klaxon horn sounds as your first officer cries, "Battle stations! Battle stations!" You are underway in one of the most vital and vulnerable weapons of World War II, the submarine. You have a crew to command, machinery to maintain, and a mission to complete. You must respond to events with speed and authority. Oceans are not the playgrounds of the indecisive.

Choose Your Side

Sub Battle Simulator from Epyx lets you command a German U-boat assigned to Atlantic duty in 1939, or an American sub scouring the Pacific Ocean to engage the Japanese Imperial Fleet in 1942. In either case you call the shots. You're skippering one of the deadliest fish in the sea, bristling with the most sophisticated equipment and weaponry of the day—sonar, radar, torpedoes, mines, and antiaircraft guns. This is total submarine warfare.

Commanding Your Vessel

Glowing before you are the eyes of your vessel and the control panel. There are two windows on screen. To the right is the visual display showing periscope, deck, and binocular views, as well as sonar and radar screens. On the left is a map display that shows the local geography, your location, and the location of enemy craft. Between the two windows is a toggle-button strip that controls the various views. The control panel allows you to set your depth, speed, heading, and view gauges. Above the controls is the crew-speech display. Several toggle buttons also allow you to control power sources, diving, periscope height, weaponry, and time compression.

It takes a while to master *Sub Battle Simulator.* Not all commands are on pull-down menus or the screen display—you must use the keyboard to lay mines and perform some other operations. While Epyx provides excellent documentation and a command summary card, the keyboard commands do prove to be a nuisance. And beware: there is no on-line help.

However, when you get the hang of *Sub Battle Simulator* the game changes dramatically. Suddenly it all makes sense. You know the keyboard. You know your ship. You are in command.

The Reality of Command

Humans and their machines are fallible. In *Sub Battle Simulator,* the higher the level of the game, the more likely you are to experience the actual failure rate of crew and equipment. In this sense *Sub Battle Simulator* is more than a game. It is an exercise in living history, painstakingly researched and crafted by the same mad geniuses that created *Orbiter* and *Gato.*

Sub Battle Simulator represents a milestone in computer software—it is the most accurate simulation I've ever seen. I expect that *Sub Battle Simulator* will become the new benchmark for simulation programs.—*Ken Goebner*

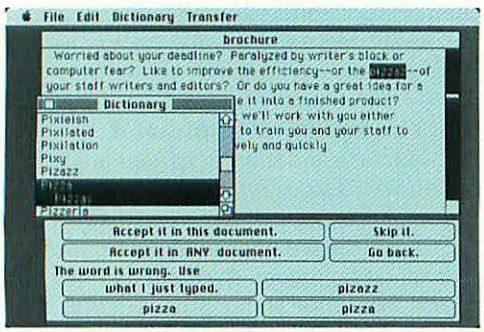
A Champ Comes Back

***Spelling Champion** 2.2*

Spelling checker. ***Pros:*** *Low price; large dictionary; economic use of disk space; automatic transfer to most word processors.* ***Cons:*** *Doesn't check capitalization; cannot check interactively.* ***List price:*** *$39.95.* ***Requires:*** *128K.* ***Copy protection:*** *None.*

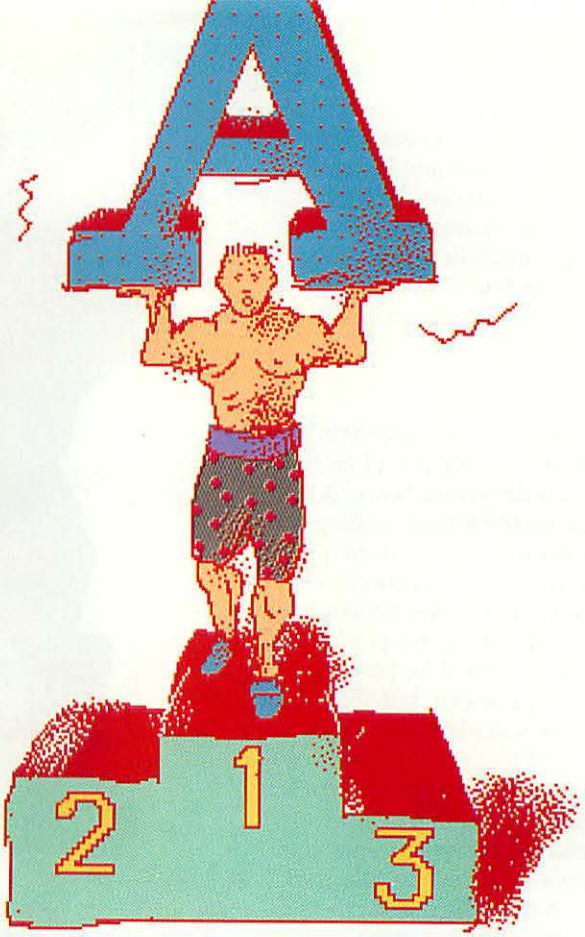


Similar to *Spellswell* but much more elegantly executed, *Spelling Champion* from Champion Software is one of the best stand-alone spelling checkers for the Macintosh—slim, speedy, and accurate. The original version of *Spelling Champion,* released last year, was agonizingly slow to load, but the latest upgrade zips through the loading process at well under a minute for a one-thousand-word document. The dictionary is now up to 125,533 words, yet program and dictionary together account for only 231K—small enough to fit comfortably with either *MacWrite* or *Microsoft Word* 1.05 on a single-sided disk. This size allows easy use of the built-in transfer utility, which instantly enters corrections into your word processing document. *Spelling Champion* can also fit on an 800K disk that contains *MacWrite, Word,* and a healthy System Folder.



More Than a Suggestion

Spelling Champion *finds words in context, shows a user-modifiable dictionary, and suggests proper spellings. By selecting text in the document window and clicking "What I just typed," you can also make content changes in a document without reentering the word processor.*



Errors and Additions

Spelling Champion is a breeze to use. The program counts words, shows all possible errors in context, usually suggests correct alternatives, and enables the user to edit not only the words it flags, but also any part of the document that shows up in its window. As with most spelling checkers, words can be ignored or replaced, or accepted for one or all documents (see "More Than a Suggestion"). If you accept a word for all documents, *Spelling Champion* won't flag further occurrences in that document, but the program waits to add the word to the main dictionary until you confirm it later, using a command called "Review new words one by one." Then, for each root word, it accepts up to eight suffixes and lets you decide whether to double the final consonant. Again, at this stage you can ignore, remove, add to the main dictionary, type your own choice, or quit.

The only problems I've experienced involve adding new words to the main dictionary. Sometimes words selected as "Accept in any document" don't show up in the new words dictionary and don't get added to the main list, which means that you must add the words again when you come across them.

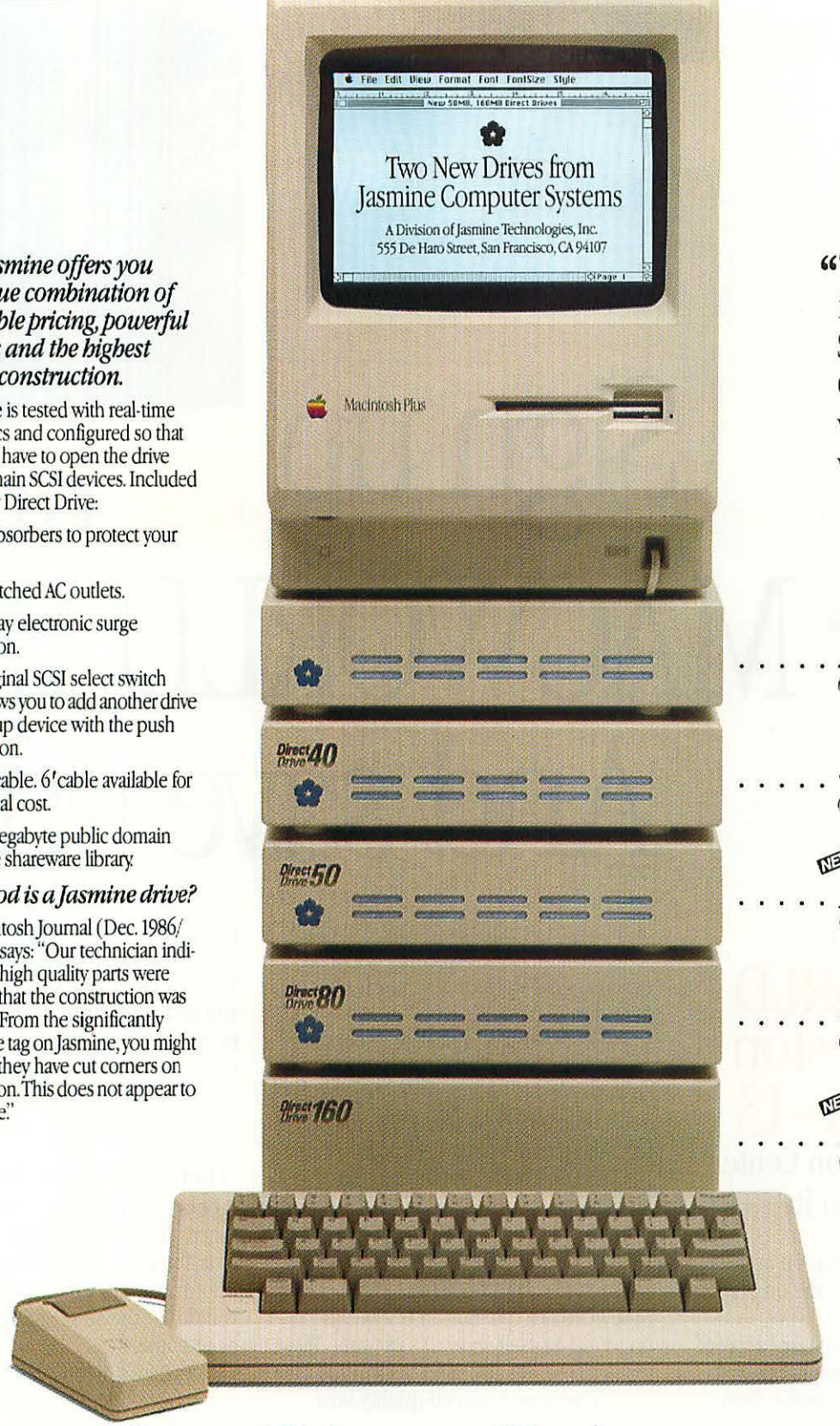
If a word gets in by mistake, it can be removed easily: open the dictionary, type the first couple of letters to scroll to the general area, click on the root, and use the Remove command.

Room for Improvement

Although *Spelling Champion* is smarter about adding words and takes up significantly less disk space, it is inferior to *Spellswell* in two areas. First, it is not case sensitive. It can't differentiate between proper nouns and ordinary words, and it can't catch a stray capital letter in the middle of a word. Second, it can read *MacWrite* 2.2 files but it can't correct them. You have to reenter the word processor to fix errors. However, it automatically corrects *MacWrite* 4.5, *Word* 1.0 and 1.05, and text-only files.

Also, the dictionary resists hyphenating words and almost always suggests the unhyphenated version of a word, a stylistic preference that should be left up to the author. But unless you make many capitalization errors or need a homonym dictionary, *Spelling Champion* may be the best combination of reasonable price, functionality, and ease of use—at least among stand-alone checkers. If you want a desk accessory checker, you'll have to look elsewhere; otherwise this program is a very good choice.—*Shel Horowitz*

See *Where to Buy* for product details.



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– The Macintosh Journal December 1986/ January 1987

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Circle 570 on reader service card



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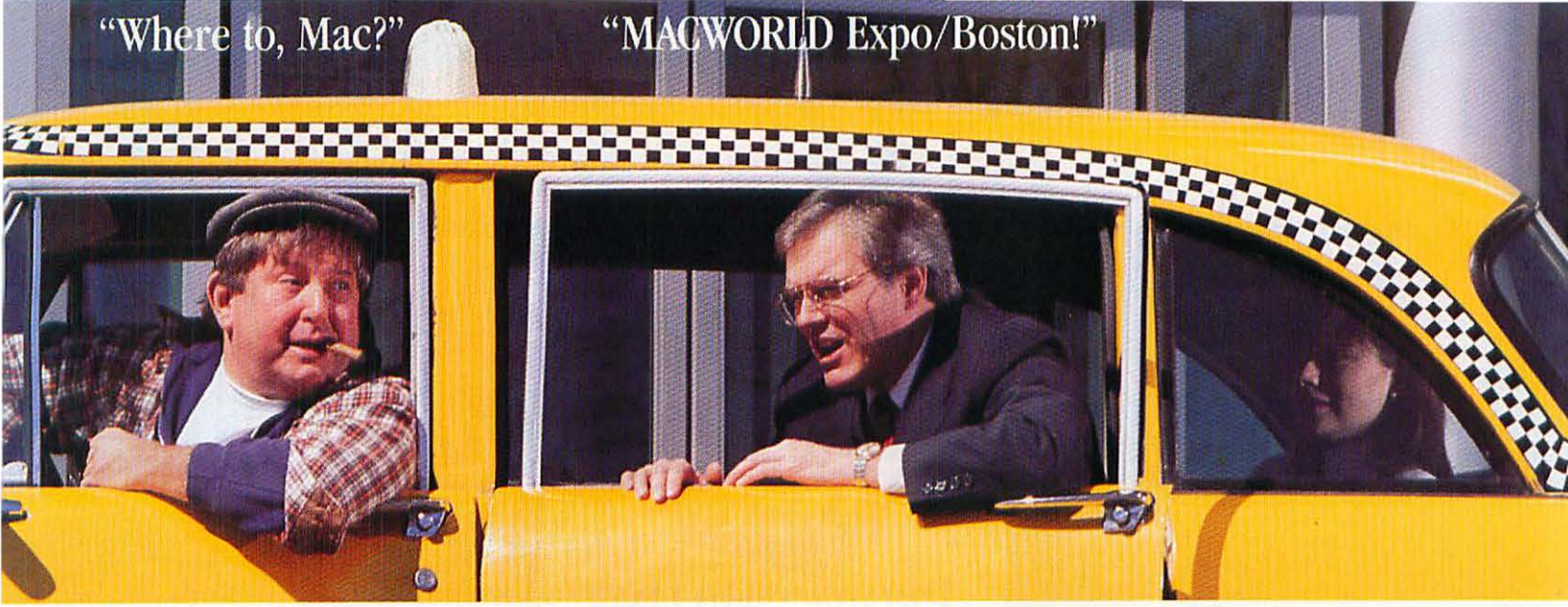
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Our exhibitors list. (As of April 1, 1987.) A who's who of people who design, develop and produce hardware, software and peripherals for Macintosh. 3Com Corp., Abaton Technology Corp., Addison-Wesley Publishing Co., Adobe Systems, Inc., Advanced Computer Graphics, Advanced Elec. Support Prod., Inc., Affinity Microsystems, Ltd., Aldus Corp., ALSoft, Inc., Altsys Corp., Ann Arbor Softworks, Apple Programmer's & Developer's Assoc., Ashton-Tate, AST Research, Inc., Avantec, Inc., Bering Industries, Inc., Berkeley Macintosh Users Grp. (BMUG), Blackhole Technology, Inc., Blowhard Industries, Blyth Software, Inc., Borland International, Boston Computer Society, Boston Publishing Systems, Inc., Bravo Technologies, Inc., C.I. Tech International, Inc., Cambridge Electronics, Inc., Capilano Computing Systems, Ltd., CasadyWare, Inc., CE Software, Centram Systems West, Inc., CHA Services, Inc., Chang Laboratories, Inc., CMS, Cognition Technology Corp., CompServCo, Compu-Teach, Inc., CompuCover, Computer Expressions, Computer Museum, Computer Shoppe, Computer Shopper Magazine, Computer Ware, COMTREX, Ltd., Consulair Corp., Cortland Computer, Cricket Software, Inc., Data Tailor, Inc., DataSpace Corp., Dayna Communications, DEST Corp., Digital, Etc., Inc., Dove Computer Corp., Dynamac Computer Products, Inc., Dynamic Graphics, Inc., E-Machines, Inc., E.I. duPont de Nemours & Co. (Inc.), Educomp, Erez Anzel Software, Ergotron, Inc., F.C. Brooks & Co., F.L.I., Farallon Computing, Ferranti-Dege, Inc., First Desk Systems, Inc., Flexware, Forethought, Inc., General Computer Co., Great Plains Software, Great Wave Software, Hayden Books/Howard W. Sams & Co., Hayes Microcomputer Products, Inc., Heizer Software, Hewlett-Packard Co., High Performance Systems, Inc., I/O Design, Inc., ICOM Simulation, Icon Concepts The Macazine, IDAC, Inc., ImageWorld, Inc., Infosphere, Inc., InfoWorld, Innovative Data Design, Inc., Intelitec, Internet, Invention Software, Jasmine Computer Systems, Kensington Microwave Ltd., Kent Marsh Ltd., Kinetics, Inc., KMW Corp., Kroy Sign Systems, Language Processors, Inc., Language Systems Corp., Laserware, Inc., Layered, Inc., Letraset U.S.A., Levco, Linotype Co., Living Videotext, LoDOWN, Logic eXtension Resources, Lotus Development Corp., Lundeen & Associates, Mac Buyer's Guide/Redgate Comm. Corp., MacBriefs, MacMemory, Inc., Macropac International, MacTutor, MacUser Magazine/Ziff-Davis Pub. Co., Mainstay, Manx Software Systems, Inc., Meta Software Corp., Micah Storage Systems, Micro Planning International, MicroGraphic Images Corp., Microsoft Corp., MicroStore, Mindscape, Inc., Mirror Technologies, Monogram Software, Inc., Nantucket Corp., National Association of Dsktp. Pub., National Instruments Corp., Northeast Data Processing Supplies, Odesta Corp., Office Talk, Orange Micro, Inc., Palantir Software, Panamax, Paragon Concepts, Inc., PC World Communications, Inc., PEAK Systems, Peripheral Land, Peripheral Systems, Inc., Personal Bibliographic Software, Inc., Personal Computer Peripherals Corp., Personal Training Systems, Practical Computer Applications, Inc. (PCAI), Pro Plus Software, Inc., Prometheus Products, Inc., Quark, Inc., Radius, Inc., Relax Technology, Ribbon Land, Rodime, Inc., Peripheral Systems Div., Satori Software, Scott, Foresman/Little Brown, Silicon Beach Software, Inc., SmethersBarnes, SMS, SoftView, Software Discoveries, Inc., Solutions, Inc., Spectrum HoloByte, Springboard Software, SuperMac Technology, Symmetry Corp., Systat, Inc., T/Maker Co., Tacklind Design, Inc., Target Software, Inc., TeleRobotics International, Inc., The Macneal-Schwendler Corp., The Madson Line, The Rest of Us, THINK Technologies, Inc., TML Systems, Inc., TPS Electronics, Typesetting Service Corp., Unicom, Washington Apple Pi, Ltd., White Pine Software, Inc., WordPerfect Corp., Working Software, Inc., Ziyad, Inc. And there are more to come! MACWORLD Exposition/Boston is the original Macintosh computer show. It's sponsored by MACWORLD, the Macintosh™ Magazine, a member of the CW Communications/Inc. family.



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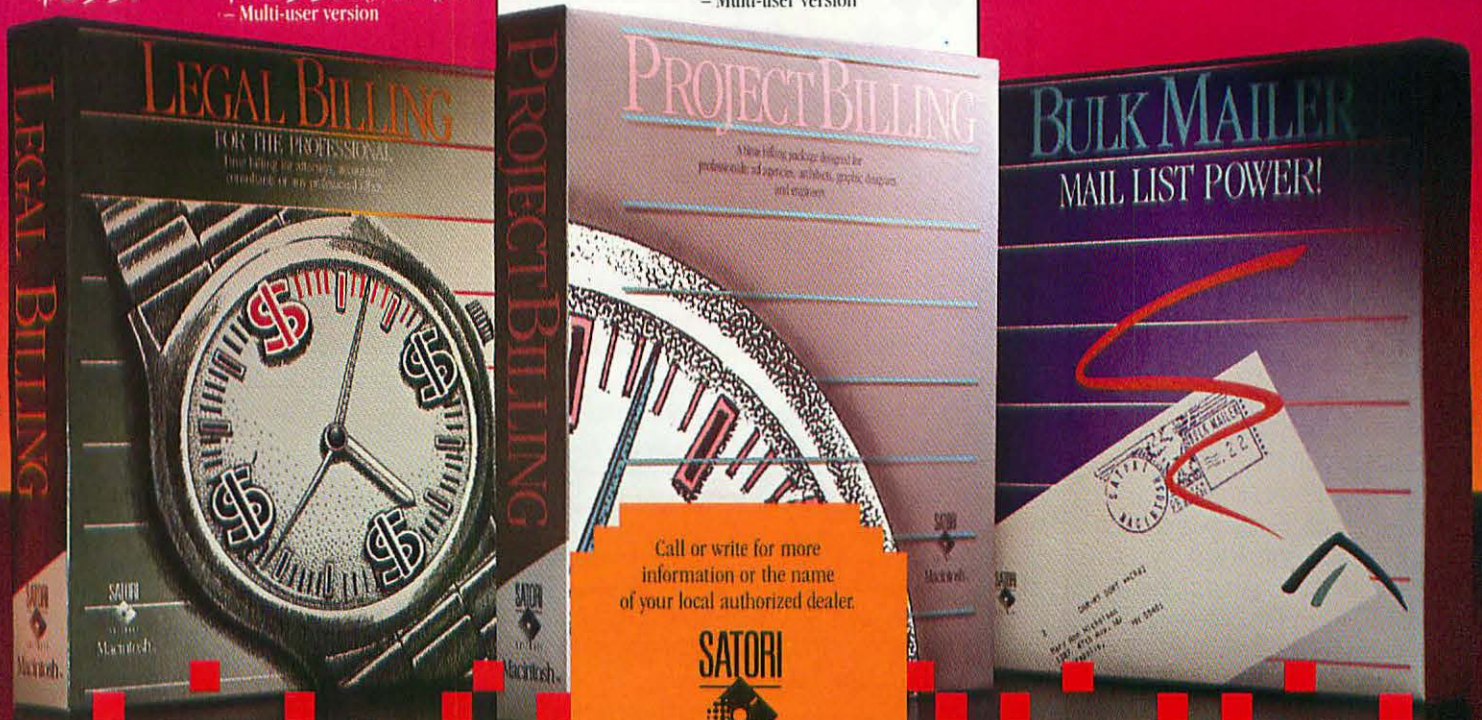
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New Products

Information on the Mac's latest software, hardware, and accessories

Edited by Eileen Drapiza

New Products includes Macintosh products that have been formally announced but not yet evaluated by *Macworld*'s editors. All prices are suggested retail prices. Please call vendors directly for information on availability.

SOFTWARE

Corporate Image Templates Forty-one public domain *PageMaker* templates for business printing. Instructions, examples, clip-art files, blank templates, and hints on specifying printing parameters. 512K minimum memory. Disk #76 $9 plus shipping and handling. Public Domain Exchange, 408/496-0624.

Cue, The Film Music System Support system for film composers and music editors. Automates paperwork and calculation procedures for creating music that synchronizes to visuals. Prints cue sheets and score paper for each cue, a master cue list, and a performing-rights cue list for the entire production. *Cue* fits tempos and offsets (if required) to key cue points in film and video. Click tracks can be played through the Mac, and streamers and punches may be displayed on screen. 512K minimum memory. $499. Opcode Systems, 415/321-8977.

Disktop Desk accessory that enables you to copy, rename, delete, set Finder file information, select multiple files to work on simultaneously, and move files on the desktop while within a program. Includes LaserStatus, a DA that monitors the AppleTalk network, and Widgets, a collection of utilities for downloading PostScript programs, printing *Paint* file catalogs, and converting from PICT to *Paint* files. Introductory price $25, suggested retail $35. CE Software, 515/224-1995.

FileStar Shareware desk accessory for file management tasks such as Delete, Rename, Copy, Duplicate, Move, Get Info, Transfer. Allows multivolume search by file name, type, creator, or creation or modification date. Registration for copies obtained on line $15, source code $5, direct purchase $20. Searle Software International, 206/743-3964.

HFS Backup for AppleShare Designed for workstations on *AppleShare*. Enhances speed, backs up the directory for up to 5000 files, and includes a file "filter." 512K minimum memory. $149. Personal Computer Peripherals Corp., 813/884-3092.

IDVToolkit Develops interactive video software with Business Filevision templates. 512K minimum memory; requires external drive or hard disk. Includes manuals and Business Filevision $375. Electronic Vision, 614/593-1615.

Lottomation Generates random numbers and lottery ticket database for selecting Lotto numbers based on winning number frequency. 128K minimum memory. $9.95. Hot Data Software, 213/393-6405.

MacRepertory Tool for homeopathic practitioners. Includes a repertory database, materia medica keynotes, rubrics for analysis, and weighting remedies. Will save case information. 512K minimum memory; requires 5MB additional storage. $1380. Kent Associates, 415/457-9983.

MathFract 1.0 Two sets of math and fraction fonts modeled on Geneva or Times fonts. Free. Professor John Jacob, Pepperdine University, 213/456-4494.

Micro Planner Project Exchange Works in conjunction with *Micro Planner* project and resource management software. Imports project information from IBM *Micro Planner, MacProject,* and mini and mainframe applications. Allows merging of separate projects and dividing larger projects. 512K minimum memory. $100. Micro Planning Software, 415/788-3324.

MicroScrabble Practice French, Spanish, or German vocabulary skills by playing a familiar game in a foreign language. 512K minimum memory. $39.95. Gessler, 212/673-3113.

Merriam Webster Thesaurus for *Microsoft Word* 3.0 Lists 45,000 root words with complete definitions, automatic word substitution, and virtual cross-referencing of synonyms. 512K minimum memory; requires *Microsoft Word* 3.0. $59.95. Target Software, 305/252-0892.

OfficeTalk Communications front end that includes E-mail, downloadable graphics, and typesetting services. 512K minimum memory. $50 per address plus 50¢ service charge for downloading documents, $2 per downloaded graphic. Call for customized company logos and Linotype charges. OfficeTalk Inc., 215/664-7440.

Printworks for Mac Printer driver utility. Integrates print spooling, automatic color printing, page previewing, printing of graphics and built-in printer fonts on the same page, and proportionally spaced, near-letter-quality text printing on ImageWriter printers. Allows for printing on many non-Apple dot matrix printers. SoftStyle, 808/396-6368.

(continues)

PUP (Paragon Update Procedure) Facilitates developer distribution of updated software with an encryption program that can be deciphered only with the original software. 512KE minimum memory. License fee to software developers $195. Paragon Concepts, Inc., 619/481-1477.

Q Parser Plus Translator writing system. Includes a method for developing translators that support the automatic construction of syntax trees. Uses a new code-generation language for languages other than C and Pascal. No copy protection. 512K minimum memory. $400. QCAD Systems, Inc., 408/727-6671.

Real Estate Partners Management program that helps novice investors get started in the business of buying and selling real estate with no money down. Helps professional investors determine appropriate partnership interest to give each partner an attractive rate of return. Reports can be used for presentation. 512K minimum memory. $295. Meta Venture Technology, 818/796-5479.

Scholar's Aid Shareware designed to search text for figure, table, equation, and reference citations. Automatically numbers references and sets up *Microsoft Word* files to be printed. 512K minimum memory; requires an external drive. Registration $35. Stuart E. Strand, 206/542-1312.

Whodunit Mystery game that presents a scenario in French, Spanish, or German. 512K minimum memory. $49.95. Gessler, 212/673-3113.

HARDWARE

The Administrator Formatted storage subsystem in either 150MB or 300MB, with or without a 125MB streaming tape backup, 512K to 16MB of cache RAM, and system and utility software. Requires a SCSI port. $5995-$18,445. Racet Computers, Ltd., 714/997-4950.

ArtScan Software interface for the Kurzweil 4000 ICR Scanner. In one pass of a document page, users can scan line-art graphics and text at full resolution into *SuperPaint, MacPaint,* or PICT format files for editing, storage, or printing on ImageWriter and LaserWriter. 512K minimum memory. *ArtScan* with 10MB configuration $4500, with 30MB configuration $5500, 4000 ICR scanner $36,500. Kurzweil Computer Products, 617/864-4700.

AST-ICP, AST-RM4 AST-IPC, an intelligent communications processor, off-loads I/O processing from the Mac II to increase system performance, speed, and efficiency. Supplies extra serial ports, allowing up to four additional users to connect to the Mac II's UNIX operating system. Two of the ports may be configured to work with AppleTalk. AST-RM4, a memory expansion board, provides up to 4 additional megabytes of memory on the Mac II for use by processors residing on the NuBus under Apple UNIX. Memory expansion is incremental in 1MB units. AST-ICP with two connectors $949, AST-ICP with four connectors $999. AST-RM4 $899. AST Research, Inc., 714/863-1333.

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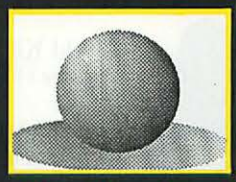
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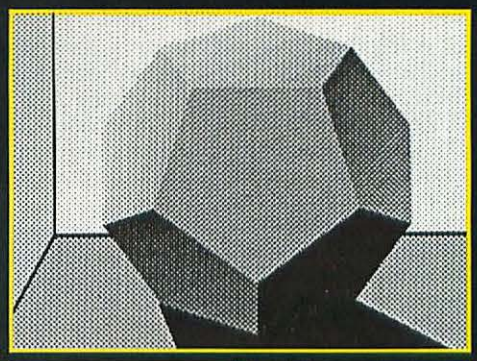
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New Products

AST-Pak A 1MB memory expansion board (upgradable to 2MB) for the Mac SE. Allows attachment of option boards for added system customization. $499. AST Research, Inc., 714/863-1333.

GPIB-SE Interfaces the Mac SE to the IEEE-488 and expands the 8-bit data path of the 68000 processor. Two options are available: an 8-MHz 68440 DMA controller and a 12-MHz 68881 math coprocessor. The GPIB-SE implements the full range of talker, listener, serial and parallel poll, service request, remote programming functions, and complete controller capabilites. The card uses a single expansion slot and supports *LabVIEW*. Base card $495, DMA option $795, math coprocessor option $995, both options $1295. National Instruments, 512/250-9119.

Hypercharger 020 A 16-MHz 68020-based processor and 1MB RAM expansion board. Plugs directly into the Mac SE expansion slot. Allows connections to other peripherals. Optional 68881 floating-point coprocessor. $1499, with optional floating-point coprocessor $1999. General Computer Corp., 800/634-9737.

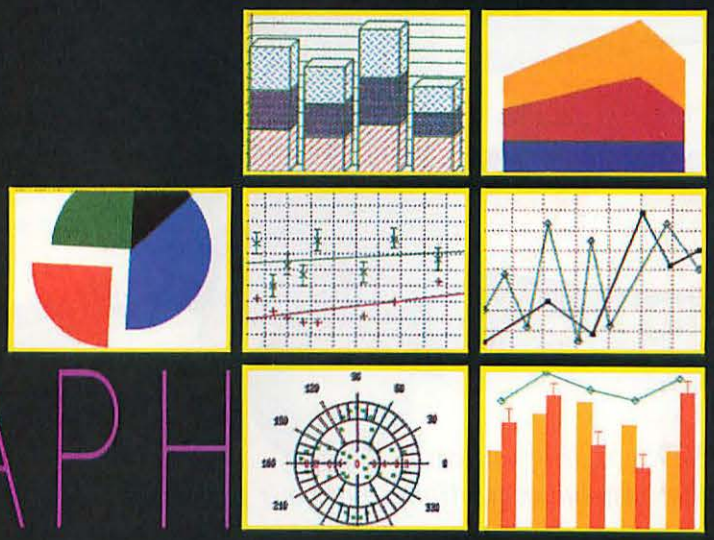
MacMainFrame SE Software and an internal card that plugs into the Mac SE expansion port, providing 3278 terminal emulation and file transfer. A coaxial connector extends from the Mac SE's access panel to an IBM control unit or display printer adapter via type A coaxial cable. $795. Avatar Technologies, Inc., 617/435-6872.

Mac86 Add-on board based on a 10-MHz Intel 8086 for the Mac SE. Provides a link to the MS-DOS environment allowing creation or editing of MS-DOS files from either the Macintosh SE's hard disk drive or an external 5.25-inch MS-DOS floppy disk drive. The Mac86 offers printer support for both MS-DOS and Mac applications. $599. AST Research, Inc., 714/863-1333.

MacOCR, Microtek SCSI Interface Scans pages of text into files compatible with popular word processing programs. Recognizes different faces, including Courier 10, Prestige Elite 12, Victoria 12, Prestige Pica 10, Pica 10, Elite 12, and Bookface Academic 10. Works in conjunction with the MSF-300C, a 300-dpi raster-image flatbed scanner, and *VersaScan Plus*. MacOCR price to be announced, MSF-300C $1995. 512K min-

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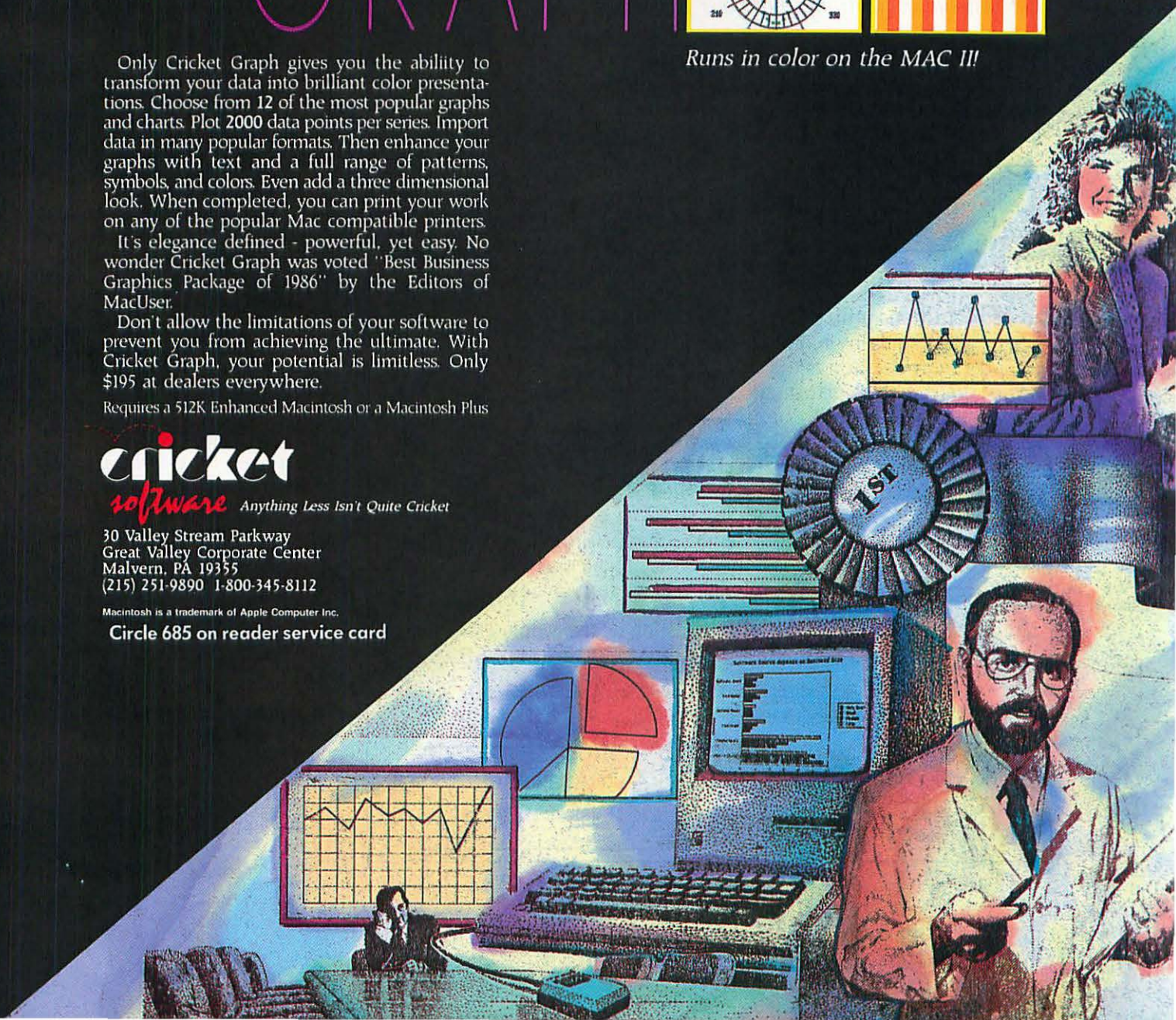
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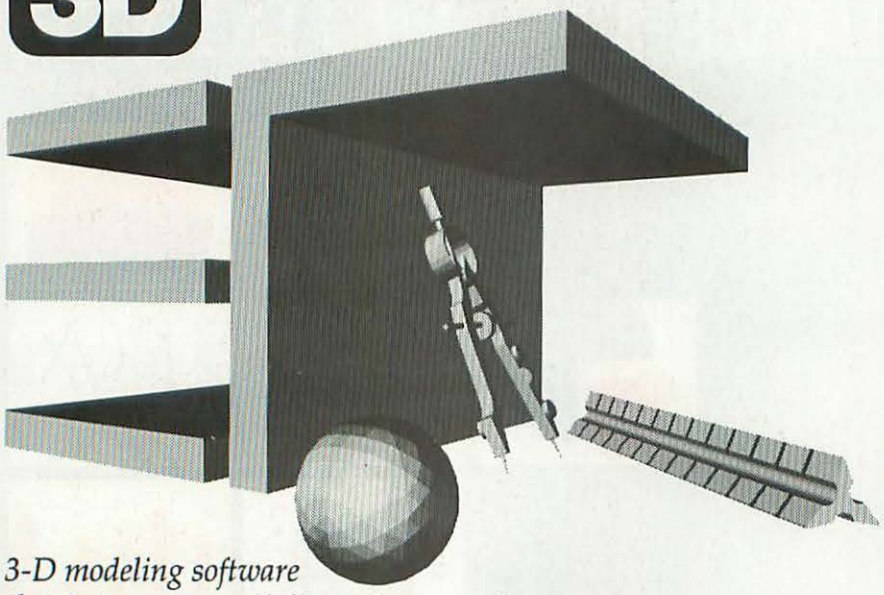
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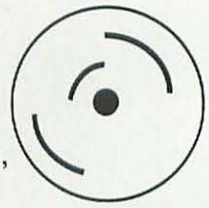
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imum memory. Microtek SCSI interface, an interface box for hooking up hard disk to scanner, cuts down transmission time. 50-pin to 50-pin. $295. Microtek, 213/321-2121.

Mac286 A self-contained 80286-based microcomputer for the Mac II. Includes 1MB of RAM, a direct-memory-access controller, a socket for an optional 80287 math coprocessor, and a controller for a 5.25-inch MS-DOS floppy disk drive. $1499. AST Research, Inc., 714/863-1333.

Memory Upgrade 4MB upgrade for the Mac Plus. $400 per module. Performance Electronics Packaging Services, Inc., 619/483-5550.

NB-GPIB Programmed I/O interface for IEEE-488 peripherals. Enables the Mac II to be a full-function GPIB controller. Offers transfer rates as high as 1MB per second. $495. National Instruments Corp., 512/250-9119.

NB-MIO-16 A multifunction analog and digital I/O board for the Mac II. Includes a 12-bit A/D converter with up to 16 analog inputs, two 12-bit D/A converters with voltage outputs, eight lines of TTL-compatible digital input and output, and three 16-bit counter/timer channels for timing. Interfaces with the National Instruments RTSI Bus for high-speed data acquisition and handling. The 12-bit D/A converter is available in three speeds. 25-second version $1195, 15-second version $1295, 8-second version $1495. National Instruments Corp., 512/250-9119.

Nutmeg Full Page Display Xerox-manufactured 15-inch portrait screen. Displays an entire 8½- by 11-inch page, has full brightness and contrast controls, and offers 720- by 900-pixel, 90-dpi resolution. The *Nutmeg* video interface card clips onto the 69000; the connector is installed flush into the security port on the back of the Mac. A low-glare filter and swivel-and-tilt stand are built into the unit. $1995. Nutmeg Systems, 203/966-3226.

PaperJet 400/XP Document Feeder Provides an additional extended paper source for the LaserWriter. Automatically feeds up to 350 sheets of paper through the manual-feed slot, increasing the 100-sheet limit in the LaserWriter tray. $1295. Ziyad, Inc., 201/568-3838.

(continues)

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You can select the default display mode of 1664 x 1200 pixels (2,000,000 pixels). Or choose the standard Macintosh resolution of 72 dots per-inch which yields an on-screen pixel resolution of 832 x 600 (500,000 pixels). You can choose from three cursor sizes and two system font sizes for legibility.

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MAC SE •USERS•

If you own Ann Arbor Softworks FullPaint and want to use it on your Mac SE, read this.

All FullPaint programs shipped prior to May 1, 1987, will not work completely on the Mac SE. For an upgrade for the SE, send us your master floppy disk, or the front page of your manual. (The address is below.) Other than SE compatibility, there is no change in this program. This offer, by the way, is open indefinitely.

Please note: For some of you, this will be your third free upgrade from Ann Arbor Softworks. We believe in supporting the people who support us, and appreciate your business.

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New Products

Parrot 1200 A cassette-sized modem (4¼ by 2¾ inches by ⅝ inch) that weighs only 3 ounces. Requires only the power available from the host computer's RS 232C serial port. Requires no batteries or A/C power. $119, bundled with communications software and an interface cable $135. Novation, 818/998-5060.

Prodigy SE Accelerator board for the Mac SE with expansion options, including a floating-point math coprocessor (16-MHz Motorola 68881), 2, 4, or 8MB of memory, and a paged memory management unit (PMMU). Base configuration $1995, math coprocessor and 2MB memory $350 each ($475 if added later). Other options to be announced. Levco, 619/457-2011.

Radius Performance Accelerator 68020 accelerator board for the Mac SE, Mac Plus, and 512KE that increases speed and graphics performance. Clips onto the logic board or the Radius FPD board. Works in conjunction with the hardware cache. $995. Radius, Inc., 408/732-1010.

ACCESSORIES

MacDesk, MacStack, Printer Stand Three colors available. Each comes in veneer or solid oak. MacDesk is 20 inches deep, 48 inches wide, and 26 inches high. MacStack and Printer Stand fit on the desktop, and may be purchased separately. Veneer MacDesk $194, solid oak MacDesk $224, veneer desk with two extra drawers $259, solid oak desk with two extra drawers $289, MacStack $42.95, Printer Stand $34. Kamar Wood Products, 602/764-3300.

Macintosh Floppy and Hard Disk Systems A book that provides details on the disk structures of MFS and HFS operating systems. Some of the sections covered in depth are sector allocation, volume-information file systems, and file allocation. Explains block, file, network, and LAN servers. $20 plus $3 shipping and handling. Micro/Analyst, 512/926-4527.

To have your product considered for inclusion in New Products, *send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor,* Macworld, *501 Second St., San Francisco, CA 94107. We reserve the right to edit press releases.* □

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19 Expressions encompass full if/and/or logic plus wild carding
20 When prompted for a file, just click and a selection box will appear
21 Up to 50 fields per file
22 Multiple indexes per file
23 File Dump allows for printing of contents of specific fields
24 Date created and last modified tracked for every record
25 All System Manager functions work with your own data files
26 Customize your Financial Statements
27 Create new Financial Statements
28 Print Statements at any time during the month
29 Have as many different statements as you like
30 Both comparative and standard statements
31 Compare against either last year or a budget
32 Have as many different budgets as you wish
33 Print statements for a specific department
34 Or print statements for a range of departments
35 Standard, recurring and accrual-type journals
36 Post journals to previous closed months in same year
37 Post journals to next month even if current month is open
38 Year-end audit adjustments
39 Allocate balance in one account to other accounts automatically
40 Allocate either as a fixed amount or on a percentage basis
41 Complete General Ledger-Trial Balance reports
42 Inquire into all transactions for a specific account
43 Inquire into the balances of any account
44 Define multiple profit centers besides multiple departments
45 Inquire into account transaction for entire year
46 No limits on number of accounts, departments, budgets, etc.
47 Accounts can be declared inactive to stop future use
48 Account numbers can be alpha or numeric
49 Delivered with predefined chart of accounts and statements
50 Complete pre-closing month-end reconciliation
51 Customize your own check forms
52 Delivered with predefined check form
53 Unlimited number of check forms allowed
54 Unlimited number of banks and checking accounts allowed
55 Complete bank statement reconciliation
56 Complete processing of stop payments
57 Void a single check or a range of checks
58 Inquire into a specific vendor or range of vendors
59 Complete check generation
60 Also, posting of handwritten checks
61 Miscellaneous cash disbursements
62 Vendor and voucher info available by just pointing and clicking
63 Complete voucher entry
64 Unlimited number of terms codes
65 Complete debit-memo processing
66 Multiple payments allowed
67 Complete discount handling and calculating
68 Both Aging and Past Due Reports
69 Custom aging periods
70 1099 Form Reporting
71 Project Cost Reporting
72 Complete cash requirements reporting
73 Both standard and recurring vouchers allowed
74 Unlimited number of vendors, transactions, etc.
75 Complete month-end processing
76 All modules run under one program
77 Specifically written for the Macintosh
78 All functions operate in separate windows
79 Multiple windows may be on the screen at one time
80 All open windows appear in the windows menu
81 Works with all standard desk accessories
82 All modules and functions are separate icons on disk
83 Full cut, copy and paste capabilities
84 Data from your own files may be transferred into General Ledger
85 Defaults can be set up in a parameter file
86 All screens are clear and easy to understand
87 All functions follow consistent formats
88 All customizable features are delivered predefined for easy startup
89 Customizing instructions in documentation
90 Supports both ImageWriters and LaserWriter
91 All modules sold separately, so you only buy what you need
92 All modules run independently with the System Manager or integrated
93 Runs on Macintosh 512k, Macintosh XL and Macintosh Plus
94 Hard disk required (Unless running on two 800k drives)
95 Version 2.1 now shipping
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 Each drive comes with partitioning, HFS/MFS support, DA volume mounter, file locator, and a backup utility with file, folder, volume and incremental capabilities.

***Special Introductory Offer:** Peripheral Land will include the 100 megabyte pack (ten 10 megabyte floppy disks) **FREE** if you purchase an *Infinity™* drive before September 30, 1987.

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The drives come with partitioning software, HFS/MFS support, DA volume mounter, file locator, and a backup utility with file, folder, volume, and incremental capabilities.

Before you decide on a 20 megabyte Macintosh SE system, consider the Peripheral Land alternative. Get the power and portability of the PL40i and PL60i.

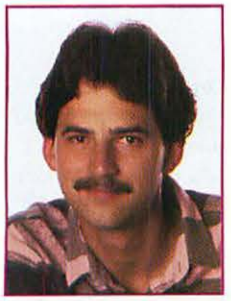
Suggested retail: $1,295.00 PL40i
$1,450.00 PL60i

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Quick Tips

Answers to your questions

by Lon Poole

Apparently lots of people out there like to load up on desk accessories; several readers have responded to February's discussion about getting past the limit of 15 desk accessories. Oft-mentioned: the shareware desk accessory *Double Apple,* which creates a second Apple menu where you install a file full of desk accessories that you have assembled using Apple's *Font/DA Mover.* But I still prefer the shareware desk accessory *Other* ($15) or its function-key twin *DA Key,* because those two don't mix up the menu bar as *Double Apple* can. Desk accessories you add with *Other* or *Double Apple* disappear from the menus when you change applications.

Other's author, Lofty Becker, adds a caution to my February instructions for using *ResEdit* to install extra desk accessories: take care when renumbering a desk accessory that has resources of types DLOG, ALRT, or DITL. Those resources may have other types of resources, such as CNTL, PICT, and ICON, embedded in them, and *ResEdit* does not renumber the embedded resources. You could renumber the embedded resources yourself, but it's easier to remove and then rearrange your DAs: use Apple's *Font/DA Mover* to install the desk accessories that have embedded resources, and then use *ResEdit* to renumber the desk accessories without the embedded resources for positioning in the extra desk accessory slots.

The shareware products are available from on-line services such as GEnie and CompuServe or from user groups such as the Berkeley Macintosh User Group, 1442A Walnut St. #62, Berkeley, CA 94709, 415/549-2684. Or call 800/538-9696 ext. 500 for the name of a user group near you.

Cover Squashes Printing

Squashed lines of type printed on an ImageWriter I may be caused by the printer's clear plastic cover. Brigid Duffy of San Francisco believes the lines compress when the paper hits the clear plastic at the wrong angle, impeding the paper's advance. She suggests leaving the clear plastic cover open, or at least propping it open part way with a pencil.

Larry Widigen, of Santa Barbara, California, also used to have trouble with squashed, wavy lines and generally nonuniform printing on his ImageWriter I. "In a moment of desperation, I raised the plastic cover and blew air across the printhead with a table fan. The results were amazing—clean, uniform print quality over hundreds of pages."

Q Clipboard Formats

In *Microsoft Word,* I can copy formatted text from one document window and paste it into another without losing any formatting. But if I copy formatted text, quit *Word,* immediately reopen *Word,* and then paste, I get plain text. The only formatting that's left is tabs and carriage returns. No boldface. No underlining. Does Apple know about this bug?

Bill Davies
Fairbanks, Alaska

A You've described a feature, not a bug. When you quit an application, it converts the Clipboard contents to a form any other application can use. Otherwise, you would be unable to paste information from one application into another.

Until recently, there was no convention for formatted text on the Clipboard. All text had to be simplified to plain text (ASCII text). With the Mac SE and Mac II, Apple introduced conventions for maintaining some text formatting on the Clipboard. Text can now retain combinations of fonts, sizes, styles, and colors between applications. There is no provision to retain paragraph and document formats, only character formats. At this writing, it wasn't clear whether these changes would be retrofitted to the Mac Plus, Mac 512K Enhanced, and earlier models. In any event, applications written before the introduction of the new machines don't take advantage of the new Clipboard features; until upgrades and new products emerge, you'll still get plain text when you cut and paste between applications.

Q Lost in CompuServe

I have been a member of CompuServe for about a year now, but the menu system deters me from using it. I realize I could buy a binder that lists all the commands or I could download them from the service itself. But I am interested in only two aspects of CompuServe: the mail service, which I *have* figured out, and the Macintosh user group.

Once I've reached the user group by typing GO MAUG or GO MACUS, I'm able to read messages. But I get lost in the data libraries. I'd like to find and download software such as a new System file, Finder, and *Switcher,* or get information about Macin-

(continues)

tosh development. How can I bypass the menus and get right to the interesting stuff?

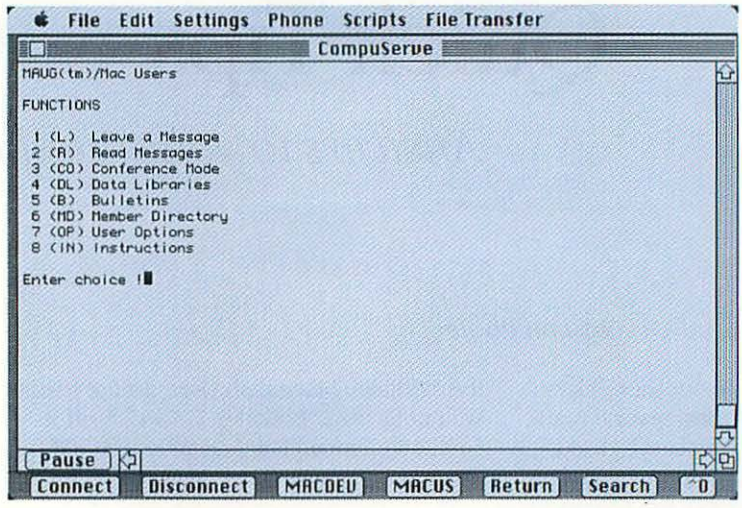
Gary Sanders
Calgary, Alberta, Canada

A You can suppress the MAUG menus by changing a user option. From the Functions menu (the main MAUG menu), enter OP. Then you'll see the User Options menu. To turn off the menus—either just for the current session or until you explicitly turn them back on—enter UM and answer the questions that appear. Turning off menus means you get a one-line prompt instead of a menu. For example, instead of the Functions menu, you get a Function prompt.

To access the software and information in the data libraries, enter DL at the main MAUG menu (see "On the Menu"). Then you'll see a numbered list of the different libraries; the list appears even if you've turned off menus. Each library contains a different category of software and information, such as desk accessories, fonts, hardware, games, art, music, and telecommunications. Choose the library you want by typing its number. If you know the number, you can save time by including it with the DL command at the Functions menu or Function prompt. For example, enter DL12 to go right to the Fonts library.

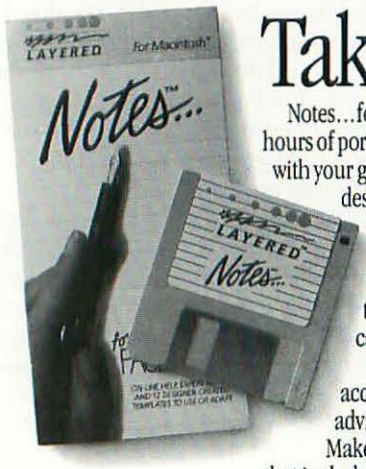
After choosing one of the dozen data libraries, enter S/DES to see a list of all the files in the library. Or, if you want the option of downloading a file after reading its description, enter BRO instead. To look for files on a particular topic, enter S/DES/KEY: followed by a key word. For instance, S/DES/KEY:FINDER would show you the descriptions of files that had the key word Finder in the current library.

A good place to start is data library 0. There you'll find help files on several topics. You can read a help file by entering R, a space, and the file name. For example, enter R UPDOWN.MAC to read about downloading files from MAUG's data libraries. (You can't read all the files in the MAUG



On the Menu
From the main MAUG menu, shown here, you can quickly navigate the Mac data libraries on CompuServe with commands instead of waiting for menus to appear.

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data libraries while you're on line because many of the files aren't plain text. Those you must download.)

Once you know the name of a file, you can download it by entering DOW at the Data Library menu or command line. You'll be asked to enter the name of the file you want and to choose a transfer protocol. Most Mac terminal applications work best with the Xmodem protocol.

After you download files, many of them require massaging before they're usable on your Mac. This includes all software, pictures, fonts, and formatted text. Such files exist on CompuServe in coded form and must be decoded. Their file names have the suffixes .HEX, .HCX, .HQX, and .BIN. Some terminal applications, such as Software Ventures' *MicroPhone* ($74.95, 415/644-3232), automatically decode files with the .BIN suffix as they download. In contrast, *MacTerminal* doesn't decode, so you have to use an application like *BinHex* to do the decoding in a separate step. For more information, read files BINHEX.HLP and MACBIN.HLP in MAUG's Data Library 0.

What's more, MAUG files with the suffix .PIT contain several related Macintosh files packed together. For example, a desk accessory and its instructions might be packed together. You must unpack them after downloading. Use the application *Packit III* (file PACKIT.BIN in DL14) or *UnPacker* (file UNPACK.BIN in DL14).

For a complete list of commands you can use in MAUG, enter IN at the main MAUG menu. When asked to state a subtopic, press Return. Then when asked to name a topic, enter three periods. You'll get about 20 pages of instructions on your screen.

Improving SuperPaint's LaserBits

Tip: One of *SuperPaint*'s best features is its LaserBits drawing mode that allows you to create images at 300 dots per inch (dpi). However, LaserBits objects cannot be grouped with other objects. Also, they are opaque, so you cannot successfully overlay two LaserBit objects. I have found a way to get around both these problems by doing a little of *SuperPaint*'s work. Here's how: select an area of your drawing, copy it to a new document, scale it to 400%, and edit as necessary. Copy your finished masterpiece to the draw layer, erase the draw layer, and then once again copy it to the draw layer—this makes it transparent. Scale the finished image down to original size (25%) and paste it into the original document. Voilà—LaserBits.

Steve Peha
Boston, Massachusetts

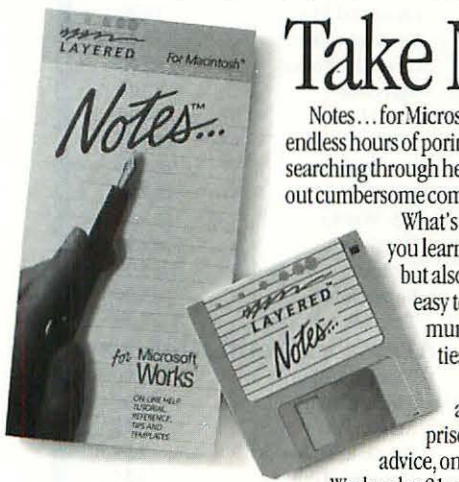
Line Up Your Decimal Points

Tip: When dealing with dollars and cents, an accountant typically prefixes the first and last numbers in a column with dollar signs; numbers in between do not have dollar signs. You could use two of *Excel*'s standard number formats, $#,##0.00 ;($#,##0.00) and #,##0.00, to accomplish this. But the space preceding the semicolon in the first format means that the decimal points don't quite line up. (The space appears in positive numbers to balance the parentheses used in negative numbers.)

The solution: make your own format. Choose Number from *Excel*'s Format menu and select the $#,##0.00 ;($#,##0.00) format. Remove the space preceding the semicolon, and click OK.

(continues)

How to get the works out of Works:



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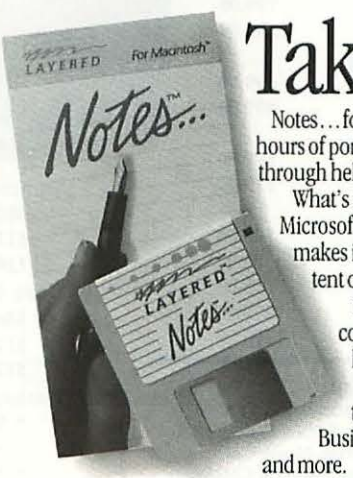
Notes...for Works is a desk accessory comprised of expert on-line advice, on how and when to use Works, plus 21 pre-formatted templates such as Customer Lists, Inventory, Travel Expense Reports and more.

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Use the new format for the first and last cells in the column of dollar amounts. If your column of numbers includes negative amounts, you will have to create different formats to align the decimal points.

Paul E. Mack
Dubuque, Iowa

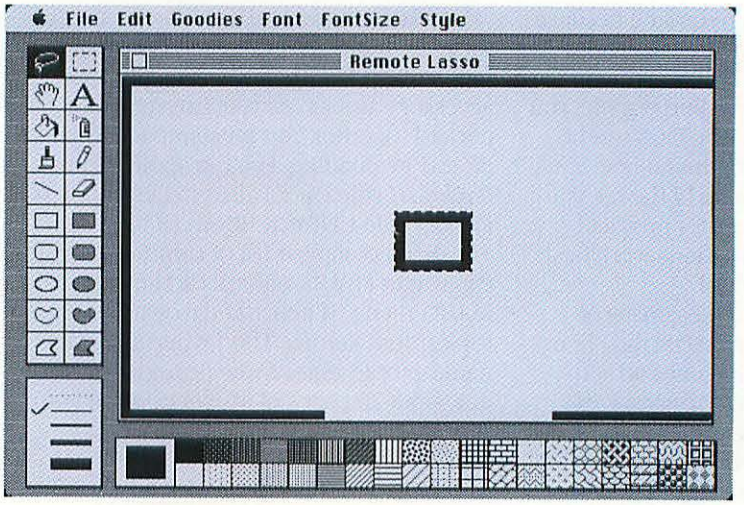
For columns with negative amounts, use the formats $#,##0.00 ;($#,##0.00) and #,##0.00 ;(#,##0.00). That's a blank space before each semicolon.

Remote Control Lasso

Tip: The article "Insights on MacPaint" [*Macworld,* February 1987] states you can move a lassoed item by remote control "by lassoing an object and moving the lasso pointer to the bottom left corner of the drawing window, carefully positioning it until the pointer turns into an arrow." Pressing the mouse button at that point allows you to drag the lassoed object.

Actually, the remote control lasso area extends from the top right corner of the drawing window across the entire top edge, down the entire left side, and about one inch toward the bottom right corner (see "The Lasso Zone"). It can also be accessed directly in the bottom-right corner.

Steve A. Carpenter
Truckee, California



The Lasso Zone
To move a lassoed object in MacPaint *by remote control, point anywhere in the area indicated by the bold line and then drag.*

Word Insights Update

Tip: Here is a more efficient technique for handling paragraph formatting with *Microsoft Word* version 1.05 than that suggested in "Insights on Microsoft Word" [*Macworld,* March 1987]: store paragraph formats, as well as division breaks, in a *Word* glossary. Glossary entries are easily called up by typing a short mnemonic abbreviation or by choosing from a scrollable list.

Tony Edwards
Washington, D.C.

(continues)

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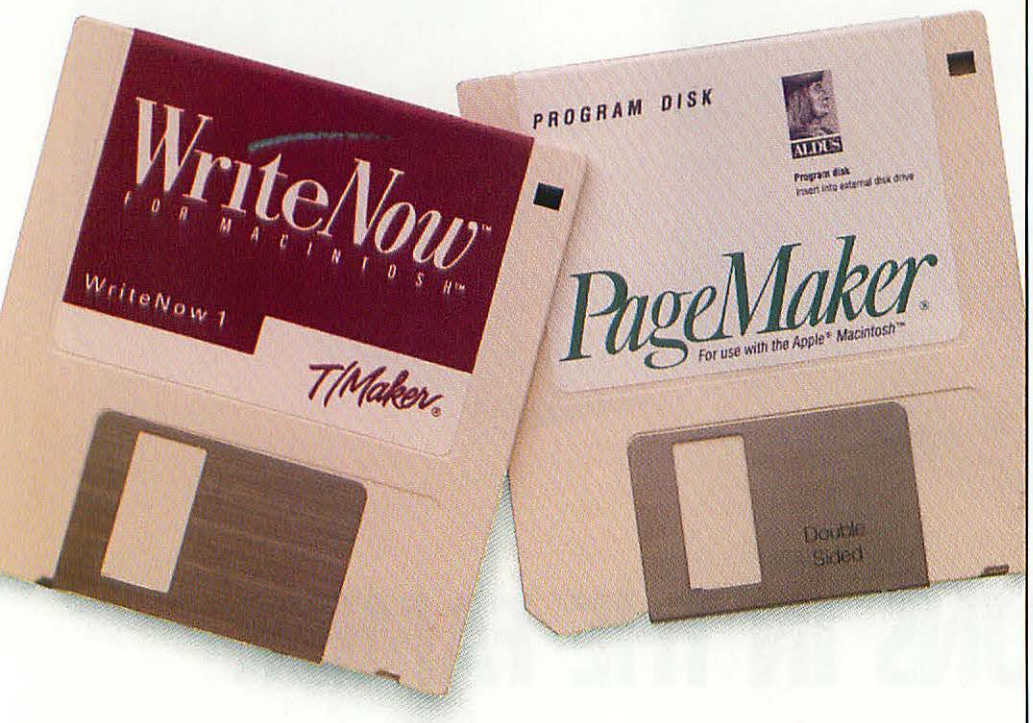
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Word's *glossary feature is more powerful than it might appear at first glance. It's not just for boilerplate text. You can store a template for an entire document—say a letter and invoice, or an envelope—as a single glossary entry. Just create a sample of the document using dummy text but actual character, paragraph, and division formats. Then copy it all and paste it into the glossary. Similarly, you can use glossary entries for often-repeated parts of documents that you want formatted alike, such as tables, figure captions, chapter openings, and numbered lists. The procedure for creating and using glossary entries is slightly different for* Word *1.05 and 3.0. Read all about it in your* Word *manual.*

And if you want to copy the format of one character, paragraph, or division to another, don't overlook Word's *shortcuts for format copying. In* Word *3.0, select what you want to copy from and press ⌘-V. Then select what you want to copy to and press Return or Enter. (See the* Word *3.0 reference manual, page 33, for another method.) In* Word *1.05, select what you want to reformat, and then press ⌘-Option while you click on an instance of the format you want.*

Tip: In *Microsoft Word,* to avoid page breaks in the middle of paragraphs without scanning for undesirable page breaks and fixing them manually, select the paragraphs whose lines you don't want split, choose Formats from the Paragraph menu, and select the "Keep lines together" option.

Marshall Plaut
Baltimore, Maryland

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Liane Reif-Lehrer
Belmont, Massachusetts

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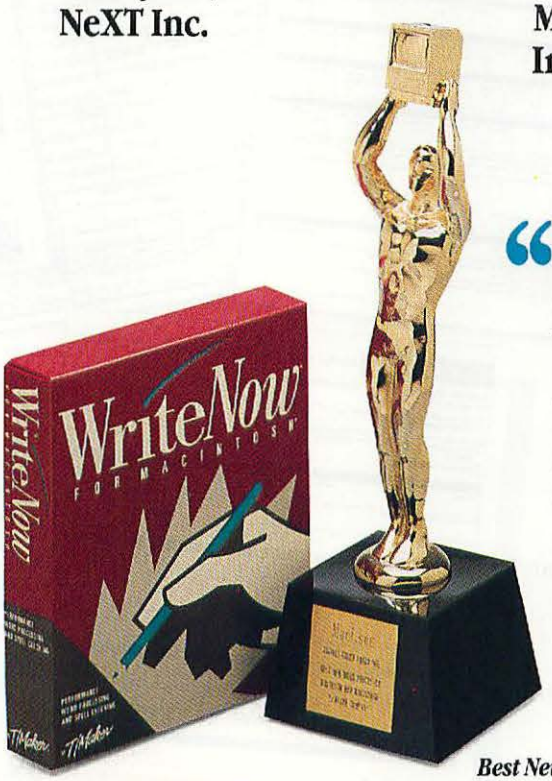
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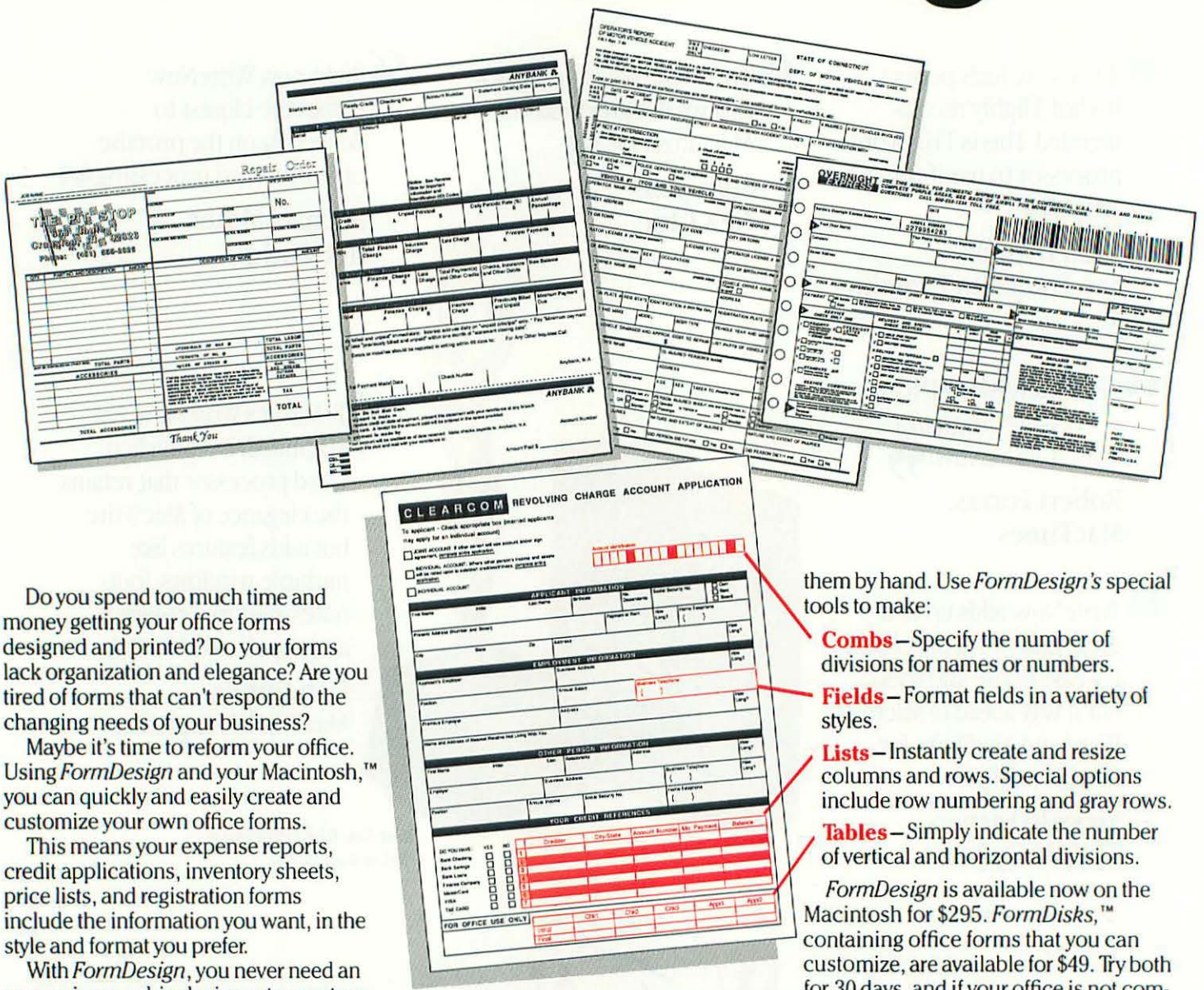
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Getting Started with Basic Maintenance

Where and how to set up your Mac, fighting dust and grime, and becoming a fan of proper cooling.

by Jim Heid

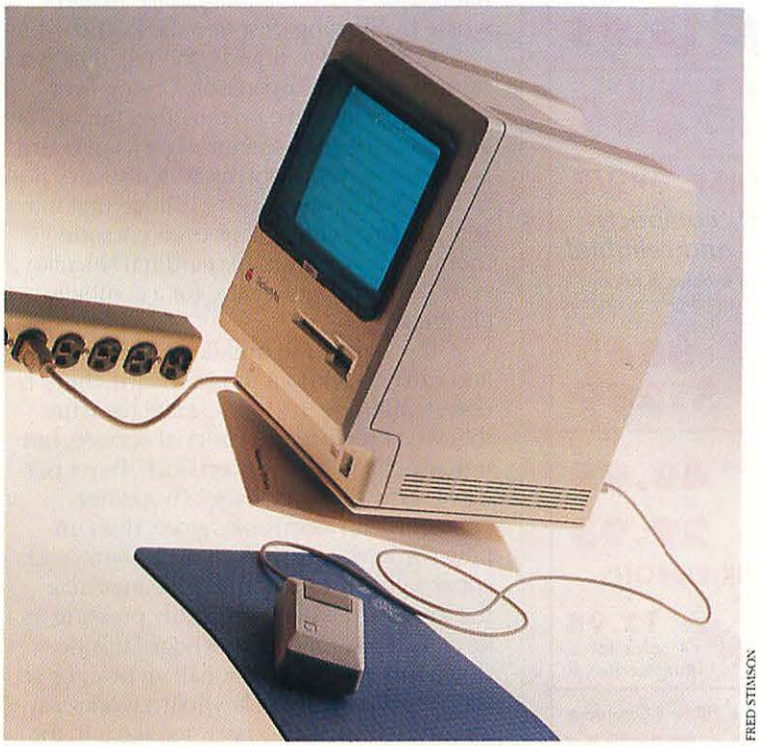
In computing's primeval period (30 years ago), computers used vacuum tubes—those glowing glass bulbs—to shuttle the binary code's ones and zeros. One IBM SAGE computer, 48 of which formed the backbone of the United States' air defense system from 1958 to 1983, used 25,000 tubes. Maintenance was hellish. A staff of technicians worked full-time keeping the four-story behemoth running, and even with a battery of built-in diagnostics, finding a faulty tube often meant turning the room lights off and looking for its weakened glow.

Today you can service a computer with the lights on. But despite the reliability of solid-state electronics, computers like the Mac still have some mechanical parts that require routine attention. You'd be surprised at how many people ignore the basics of setup and maintenance vital to a healthy Mac. Or maybe you wouldn't. If you're part of the group that believes even preventive maintenance should be prevented, this column is for you.

You'll be glad to know that keeping your Mac and its peripherals in tune doesn't require fancy equipment or a technical background. You don't have to learn a single acronym. In fact, Mac maintenance can be summarized in one phrase: keep it clean and cool.

Clean Up Your Mac

Electronic chips don't have to sparkle to work; the only items on a Mac that need cleaning are the screen and the mechanical parts—the keyboard, the mouse, and possibly, the disk drives.



FRED STIMSON

Basic maintenance starts with setting up. This Mac sports a Maccessories Tilt/Swivel, a glare filter, mouse pad, and Power Master surge protector.

Maintaining a clean keyboard involves keeping it free of dust and liquids. Each key is a switch with two contacts that close; the key generates a signal when you press it. Dust or spilled maple syrup will either prevent that signal from being generated, or will cause a kind of keyboard stuttering: you press *c*, and get six of them as the contacts intermittently make and break their connection through the grime.

To dust a keyboard, disconnect it from the Mac, take it into a different room (one without computers), turn it upside down, and blow into the keys with short, powerful breaths. Keep those breaths dry by swallowing a couple of times beforehand, and don't think about Grandma's cookies as you work. Better still, rest your lungs and buy a can of compressed air, such as Falcon's Dust-Off, at a camera store. Read the directions on the can first: with some products, unless you hold the can at a certain angle, icy wet liquid escapes that could defeat your purpose. Don't substitute a bi-

(continues)

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FRED STIMSON

Pressurized air and gravity can help clean a keyboard, but prevention is the best approach: keep the crumbly munchies at arm's length from the computer.

cycle pump, air compressor, or other unfiltered air source. It could make matters worse by blowing dust into the keyboard.

Compared to liquids, though, dust is a minor enemy to keyboards. Crying over spilt milk may serve no purpose, but orange juice or soda spattered on a keyboard is definitely weep-worthy. When sugary liquid dries, it leaves a sticky residue that may seal the key's contacts or even corrode them. If you commit this cardinal sin, take your keyboard to a dealer for a complete cleaning.

If you're in the middle of a big project and can't do without the keyboard, there is one small hope. It's a desperate measure that won't replace professional service, but it may get you through a crunch. Buy a bottle of spray contact cleaner (not tuner cleaner) at an electronics store, then unplug the keyboard, hold it over a sink, and spray a generous amount of cleaner into the keyboard while repeatedly pressing its keys. Quickly turn the keyboard upside down to let it drain. Wait half an hour or so, then try typing. If the keyboard works, say a prayer of thanks and vow to take it in for service as soon as possible. If it doesn't, or if one or two keys still act up, try cleaning it again. If you can't locate contact cleaner, try a bottle of tape-recorder head cleaner. But remember that this technique is a last-ditch effort. If you can live without your keyboard for a while, having it properly cleaned is the best solution.

The mouse is another component to keep dry. Spilled liquids can seep in around the mouse button and gum up its switch. Again, professional cleaning is the best remedy, but you can probably make do by disassembling the mouse and spraying contact cleaner into the switch. A mouse can also take in liquid from the bottom. If you roll it through a puddle, its rubber ball will pick up liquid and transfer it to the contact points, causing sluggish pointer movement or none at all. If that happens, turn the mouse upside down, remove the retaining plate that surrounds the ball (turn the plate counterclockwise), then invert the mouse and catch the ball as it falls out. Clean the ball with a lint-free cloth and clean the rollers inside the mouse using a cotton swab moistened with tape head cleaner or alcohol.

In any case, cleaning the mouse regularly is a good habit to get into, since the mouse picks up dust and lint during use. Ergotron of Bloomington, Minnesota (800/328-9839), makes a mouse-cleaning kit that lets you do the job without getting dirt under your fingernails.

Dusty Drives and the Screen

The debate over whether to clean floppy disk drives has been known to spark brawls at user-group meetings. Some say regular cleaning helps prevent disk errors by removing dust and particles that occasionally flake off a disk's surface. Clean-drive advocates regularly use kits containing a disklike item that houses a circular pad of fiber-based cleaning material. You moisten the pad with cleaning fluid, insert it in the holder, and put the holder in the drive, where it spins like a disk and cleans the heads.

(continues)

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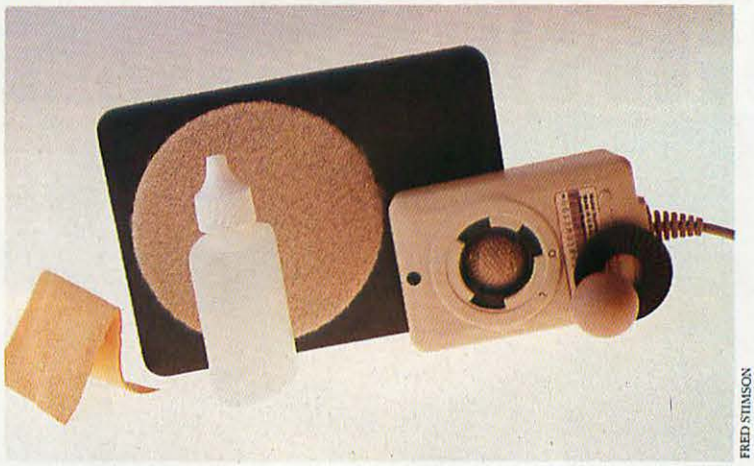
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FRED STIMSON

A fingernail or Q-Tip will do in a pinch, but Ergotron's Velcro mouse-cleaning kit really does the job when your mouse has become sluggish from caked-on dirt.

Others say, leave drives alone unless they're acting up. They claim that cleaning can do more harm than good because you can easily use too much or too little fluid, and because dirt and grime in the cleaning pad can act like sandpaper on the drives' heads. I'm from that school. Two of my Macs are approaching their fourth birthdays, and their never-cleaned drives have never misbehaved–despite nearly constant use in a house plagued with woodstove dust in the winter and pollen in the summer. I'm not saying that cleaning is bad for drives, mind you: I'm just presenting both sides of the story. I believe cleaning is unnecessary–if you avoid bargain-basement disks and prevent an accumulation of dust in your work area.

Improper cleaning can also damage the Mac's screen, since it has a nonglare coating that common glass cleaners will promptly dissolve, turning the finish from matte to glossy. You can keep the screen clean with lint-free tissues (such as Kimwipes) or photographic lens-cleaning tissue. If you must use a liquid to remove sticky fingerprints, use a cleaning fluid made for computer screens. It won't harm the finish, and some of those products repel dust. Although you can use window cleaner to clean the Mac's case, make sure to spray it on a cloth (not a linty paper towel) rather than directly on the case.

Beat the Heat

Cleaning is important for the Mac's mechanical parts; cooling is vital for its electronic ones. Electronic components have self-destructive lifestyles. Heat is their worst enemy, yet they generate heat as they work. To keep the parts cool, you must ventilate a computer's case so that cool air can replace hot. The designers of the first Macs (the ones preceding the SE and II) placed cooling vents at strategic locations in the machine's case to provide what's called *convection cooling*. Heat created inside the machine rises and exits through vents in the top of the case, drawing in cooler air through vents at the bottom. This clever arrangement allows air to circulate through the case without the need for a noisy fan. But you can easily thwart the process by blocking a set of vents. If you cram a Mac between books or magazines (or use it on a bearskin rug), you'll block the lower vents, preventing the intake of cool air. If you put it under a shelf or set books or papers on top of it, you'll block the top vents, trapping the hot air inside. Either way, the result is the same: you'll choke off the flow of air, allowing heat to build to potentially damaging levels. And damaging doesn't have to mean chip meltdown. Even if it doesn't damage the hardware, too high a temperature can cause a system crash.

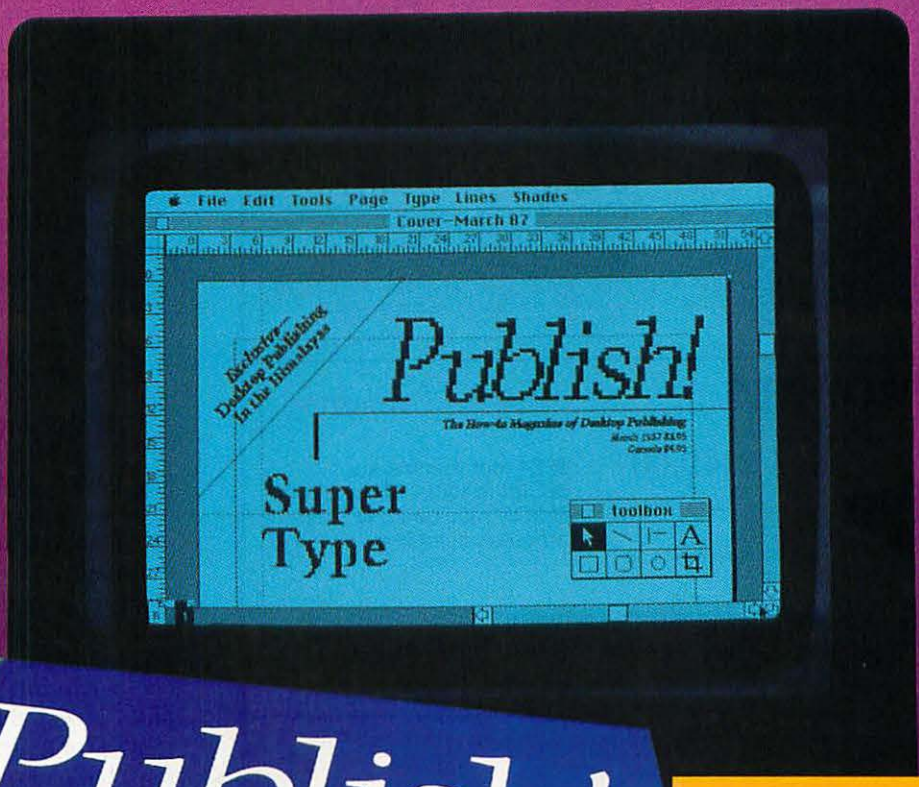
To beat the heat, then, give a Mac room to breathe: an inch or two on the sides and several more on the top. Keep it away from a radiator or other heat source. Also, keep it out of sunlight. Direct sun will bake a Mac and cause screen glare to boot.

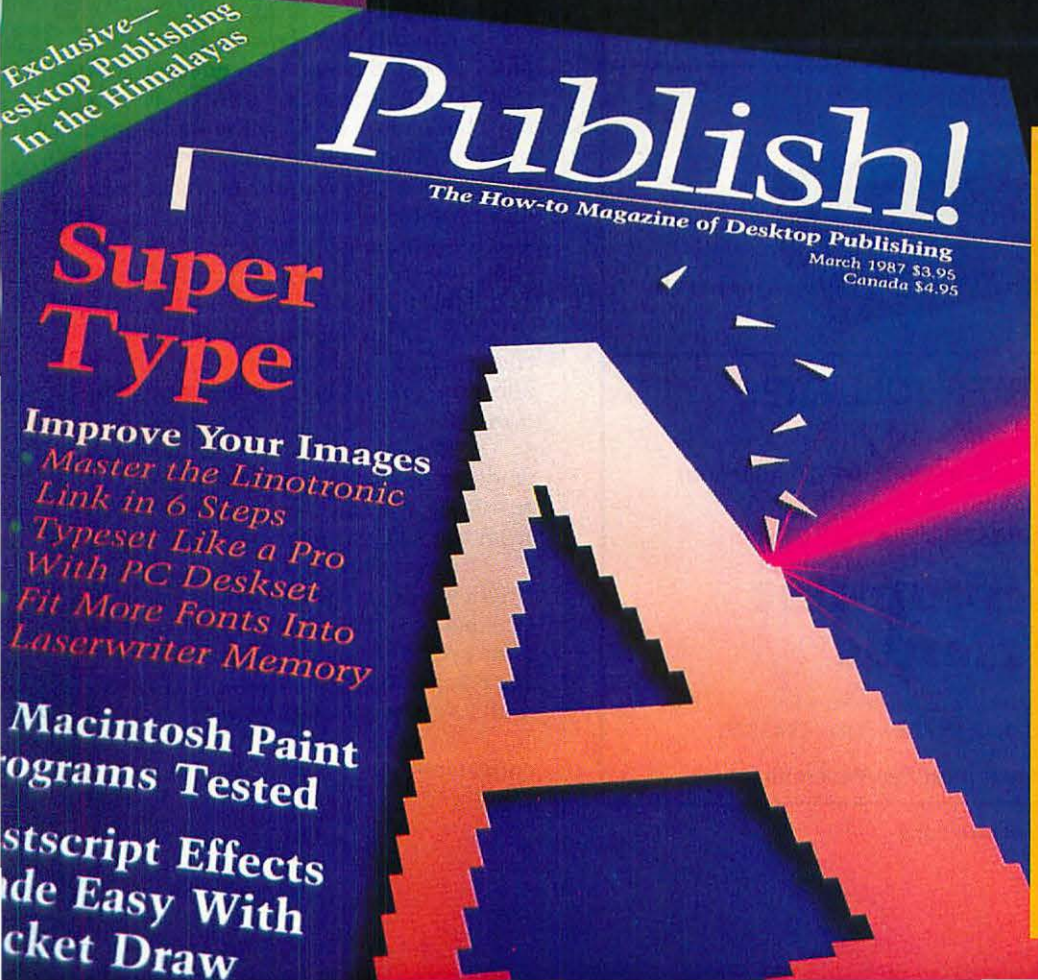
A Case for Fans

An especially effective way to chill your chips is to add an external fan such as BeckTech's Fanny Mac (its real name) or Kensington Microware's System Saver. External fans usually fit in the niche that forms the Mac's carrying handle, which may be a drawback if your Mac moves around with you. An alternative is an internal fan like Levco's MacBreeze, a piezoelectric fan that moves air with a special solid-state device instead of the common

(continues)

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motor-and-blades arrangement. MacBreeze is said to be noiseless, although I've never heard (or not heard) one to verify the claim.

A fan increases the flow of air through the machine, although keeping the vents clear is no less important. Some people think fans are for ballparks and hate the idea of losing the Mac's aural unobtrusiveness, but if you work in a large office or use a hard disk or some other fan-equipped gear, you won't notice a fan's extra decibels.

But don't feel you must have one; the returns aren't in yet on the effectiveness of these fans in preventing damage to your components or data. Your Mac's fan-free cooling scheme will keep it temperate, provided you follow the ventilation rules. Consider a fan, however, if you've added a memory upgrade of at least 1 megabyte to a 512K Mac, if your Mac Plus brims with SIMM memory upgrades, or if you live in a tropical climate.

The Complete Mac Wardrobe

Cleaning and cooling will keep your Mac healthy, but what about you? Your equipment should be set up to allow you to use it without having to hire a live-in ophthalmologist and chiropractor. Fortunately, several companies have come to the rescue with gadgets and gizmos that all the well-dressed Macs are wearing.

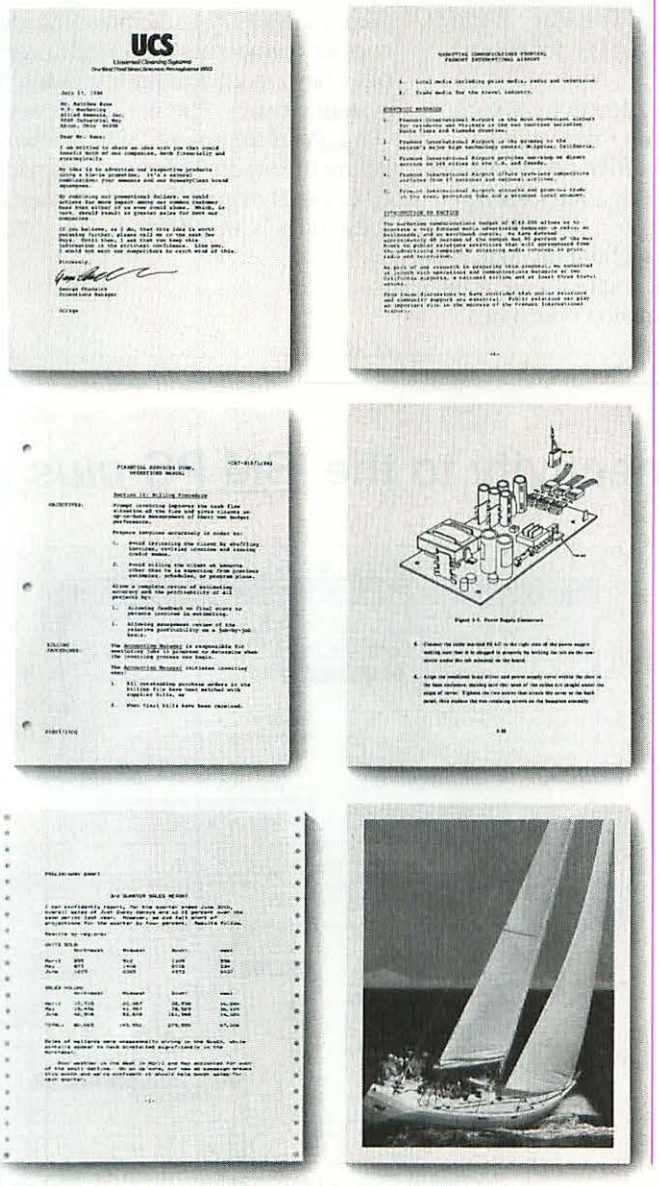
■ *Tilt-and-swivel stand* For me and many others, the Mac's screen is too low to look at for hours on end without developing a pain in the neck. Swivel stands made by Curtis Manufacturing, Ergotron, or Kensington raise the Mac and let you tilt it to a more comfortable viewing angle. You can also try propping up the front of the machine by placing something under it, such as the lid of a disk box or two 1½-inch-high plastic furniture-leg tips (my personal choice). Incidentally, tilting a Mac does not affect the operation of *Pinball Construction Set*.

■ *Mouse pad* This square of rubber smooths mouse movement and protects furniture. You can even make one yourself from wet-suit neoprene.

■ *Glare filter* If you work near a bright window or under a bank of fluorescent lights, screen glare may take its toll on your eyes. Kensington Microware's Polarizing Filter is made by Polaroid and attaches with velcro to the Mac's screen.

(continues)

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■ *Typing desk* Many desks are too high for comfortable typing. To avoid back strain, you should use a typing desk that's roughly 27 inches high. Get a desk intended for typing, and avoid those so-called computer tables with shelves that place the screen at forehead level. To protect your neck and your ego, you should look down slightly on a computer.

■ *Surge suppressor* To guard against lightning bolts and power surges (very brief but potentially very damaging increases in the power company's voltage), you might want to consider a surge suppressor. Some surge suppressors also contain power filters, which smooth out the incoming voltage and help remove "noise" that power equipment or thunderstorms can cause. Many people swear by these items, but I've never found one necessary.

Engineers I've talked to say a more common power problem is a voltage sag, also called a brownout, which can occur when a nearby power-hungry device like a clothes dryer or air conditioner comes on. Surviving voltage sags requires more complex and more expensive circuitry. The best power security is a device called an uninterruptible power supply or standby power supply, which contains batteries that provide a minimum of five minutes of juice after a power failure–not a long time, but enough to save and shut down safely.

Odd and Ends

While we're talking electrons, I should pass on some other electricity-related maintenance tips. One concerns the battery that goes in the slot above the power switch on pre-SE Macs; this battery powers the built-in clock and saves the Control Panel settings when the machine is off. It looks like a 1.5-volt AA flashlight battery, but it isn't. It's a 4.5-volt battery, an Eveready 523 or equivalent. If your Mac's clock starts losing track of time, the battery is probably exhausted. You can buy a replacement, which should last about two years, at a camera store. (The Mac SE and II have lithium batteries that last for seven years.)

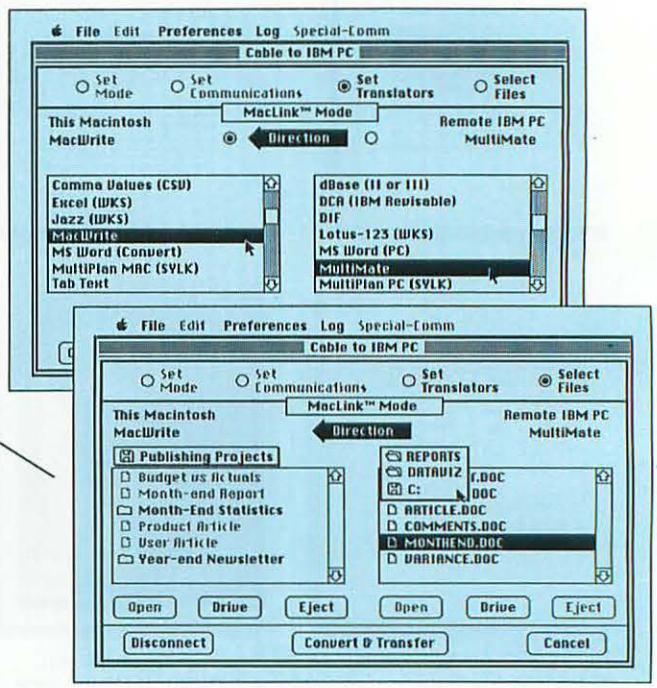
Then there's static electricity, which can be as disastrous to an integrated circuit as heat. If you've just shuffled across a wool carpet on a dry winter day, touch a metal light switch plate, a radiator, or your spouse's nose before touching the Mac. That's especially vital if you're about to install or remove an expansion board in a Mac II or SE. The closer you get to integrated circuit chips, the more important it is to be static-free.

Static electricity can also zap disks, scrambling just enough information to make the disk unreadable. Speaking of disks, they warrant their own special care, which boils down to no heat, no dust, no bending, and no magnetic fields (see "Getting Started with Disks, *Macworld,* December 1986). And if you have an external disk drive, don't set it to the left of the Mac (near the power supply) or underneath a high-intensity desk lamp (the kind with a transformer in its base). Both generate magnetic fields that can cause disk errors.

All in all, Mac maintenance isn't a full-time job. It certainly beats the hoops I had to jump through to keep afloat my first computer, a 1977 Radio Shack Model I. Its copper connectors corroded faster than an old Chevy in an acid bath, causing frequent system crashes. The solution: a weekly "Pink Pearl treatment," which involved polishing three sets of connectors with a pencil eraser. I'm glad the only eraser I see these days is *MacPaint*'s. □

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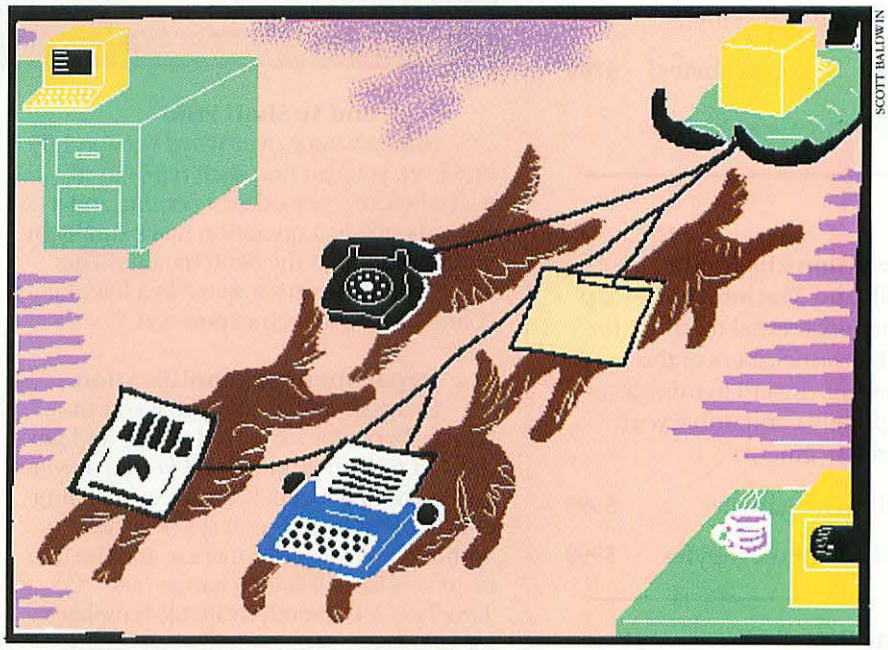
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Circle 235 on reader service card

Insights on Microsoft Works

Tips and strategies for exploiting the best-seller's teamwork and versatility

by Charles Seiter



Microsoft Works made the *Macworld Best-Sellers* list within months of its release last fall, and it now competes with *Microsoft Word* for the number one spot. Using the same simple approach that made *AppleWorks* the best-selling program for the Apple II, *Microsoft Works* offers basic word processing, spreadsheet, database, and communications functions. While there are no reports of *Omnis 3* users standing in line for the *Works* database, nor of *Excel* users furiously exporting their spreadsheets downward, the popularity of *Works* rests on two unshakable foundations. First, the program is easy to use—my ten-year-old daughter taught herself to do a mail merge *from the manual* in five minutes. Second, with a little thought you can make *Works* do nearly anything you might reasonably require from a computer. The spreadsheet is fast, the database supports complex conditional searches, and the word processor even has box/line/circle drawing functions à la *Word* 3.0. Here are tips from various sources on making *Works* work.

Mailing Labels

Microsoft reports that it fields more questions on mailing labels than on any other *Works* topic. For accurate printing, follow these hints:

- Make sure you've deleted any blank lines after the placeholders in your word-processed merge document. If you leave the blank lines there, the first few labels will look OK, but later on in the job the printing may gradually drift across label boundaries.
- Set your top and bottom margins for .125 inch. In principle, margins of zero would work, but because the slick backing on label stock tends to slip on the ImageWriter platen, it's advisable to build some margin into your printing instructions.
- Choose No Gaps Between Pages on the Page Setup menu.
- For paper height, measure from the top of one label to the top of the next label, *not* the height of the label itself. Otherwise, part of the address may end up in the space between labels.

Works doesn't let you choose more than one copy of the labels; Microsoft suggests using *Silicon Press* version 1.1 from Silicon Beach Software if you want to make multiple copies of labels in a single run.

Improper Bostonians

The default font in *Microsoft Works* is Boston—a nice, plain, legible font that doesn't look good in LaserWriter output in some sizes. In fact, the font selection that comes on the *Works* system disk doesn't include any LaserWriter fonts; if you're printing with a LaserWriter, replace Athens or another less-versatile font with Times or Helvetica (see "Font Facts," *Macworld,* February 1987).

Keyboard Tricks

There aren't any. That is, none of the ⌘-Shift arcana that delighted users of *Word* 1.05 apply, despite a powerful operational resemblance between *Word* and the word processing module of *Works.* The only keyboard hints to impart are the reminders that Shift-Return moves you *up* in the spreadsheet and database, and Shift-Tab moves you to the *left.*

(continues)

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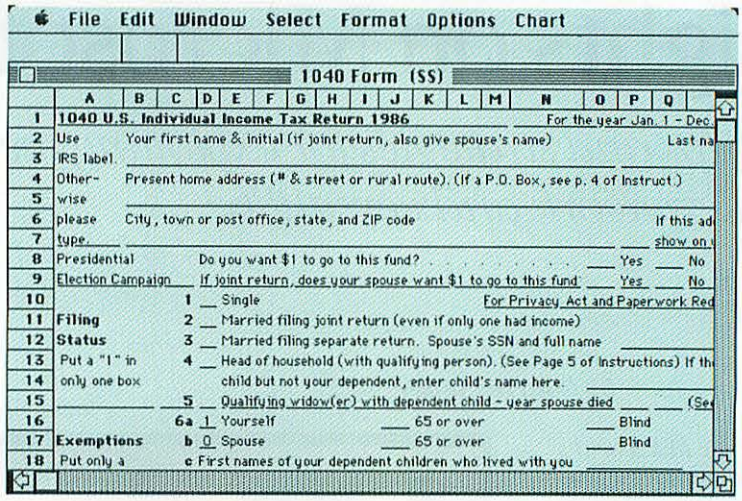
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Tax Template
This income tax template for Works *is one of many time-saving templates available from Heizer Software's Works Exchange.*

Seek and Ye Shall Find

In an advance over *Word* version 1.05, however, you can find such typos as a space before a period or a comma and a period outside a quotation mark simply by typing them into the Search menu. The program recognizes a space as a leading character in a Search expression.

Department of Amplification

Packages are available that you can add to *Works* for increased power and flexibility. I recommend *WorksPlus Spell* from Lundeen & Associates, a low-cost spelling checker that installs as a set of options within existing *Works* menus, and the template sets from WorksXchange (see "Tax Template"). Currently available templates include taxes, utilities, a tutorial, small business accounting, and personal productivity.

Works in its current version supports only the ImageWriter and the LaserWriter. For those with non-Apple printers, *Works*-compatible drivers include *The Print Link* from GDT Softworks and SoftStyle's 2.5 printer driver collection.

Picture This

With the addition of a few desk accessories and utilities, you can make *Works* produce all sorts of nifty graphics without troubling to quit and open *MacPaint*. For example, you can capture any *Works* screen with *Camera*, edit it with *Artisto*, and paste it into a word processing document. This is particularly helpful if you want to select and print split-view windows from the spreadsheet or from the database List view in a report. *Artisto* allows you to open a *MacPaint* or *FullPaint* document and clip a selected portion for pasting into the word processor. Thus you can keep a file of *MacPaint* graphics for letterheads or theme illustrations on your *Works* program disk and call up items whenever you like.

When adding graphics to a *Works* word processing document, remember to leave yourself enough white space; *Works* plunks your picture right down on top of text if that's where you left the insertion point. Correct a picture/text jumble by choosing Select Picture and Cut from the Edit menu. That's also how you remove a box or *Works* line drawing that's embedded in a text file.

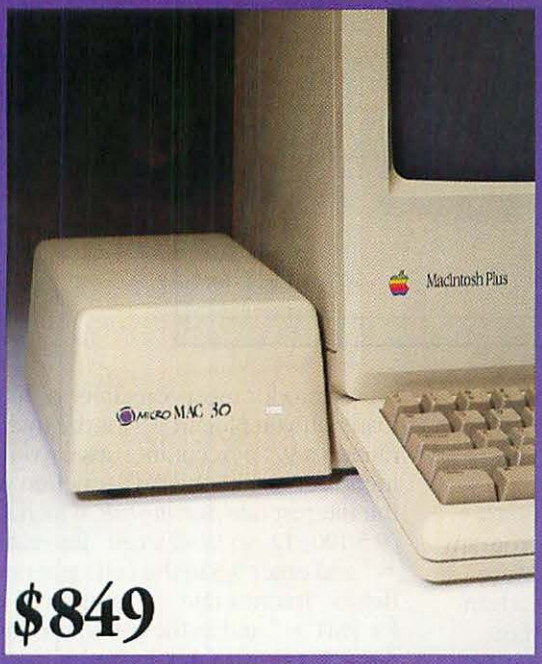
Before you add lots of fancy graphic touches, though, consider whether you can make your document look exactly the way you want using *Works* alone. If you eventually do the final layout with a desktop publishing package such as *PageMaker* or *ReadySetGo*, you'll have to pull all the graphics and convert the document to plain text anyway for exporting.

Style Consciousness

The Copy Format and Paste Format commands from the word processor Format menu can be used to mimic the style-sheet function of sophisticated products like *Word* 3.0. If you have a long document with several paragraph formats, make up dummy paragraphs at the top of your text with tags like aa1, aa2, and so forth, and set your margins, tabs, and indents for these. Put the specially formatted paragraphs in a small split-view window where you can see them without scrolling through the entire document. Then just copy and paste the formats to new paragraphs as you write. You might want to prepare a word process-

(continues)

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MICRO MAC 800 You saw it first, as the Mac535, at the Boston '85 Macworld Expo, in the pre-Mac Plus days.

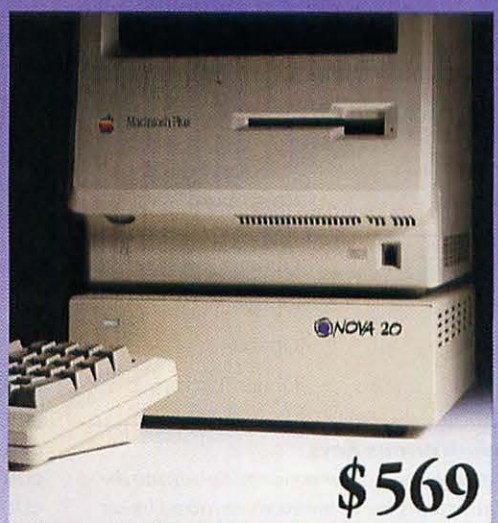
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ing template that includes dummy paragraphs for several frequently used formats; just remember to delete the extraneous paragraphs before printing.

Hanging on the Telephone

You've decided to test the communications section of *Works* and are merrily searching through an on-line database when you decide you want to quit. If you just hang up, the service doesn't terminate properly, leaving you with charges for extra time. Meanwhile, Telenet and service charges are ticking away on your MasterCard as you stare at the keyboard wondering where the Esc or Rubout key is. You have just discovered that most on-line systems use commands based on the keyboards of older terminals or IBM PCs. So when you're on-line and are asked for a command that isn't on the Mac keyboard, refer to the table "Communications Keys." The Option-Backspace command is especially important for on-line message writing. You can hit Backspace and see characters disappear on *your* screen, but they don't disappear in the transmission unless you hit Option-Backspace. Picture your favorite embarrassing scenario for this one.

If you are having trouble sending text files at 1200 bps through a packet-switching network such as Telenet or Tymnet, try setting the Line Delay from the Settings menu at 5. This produces a negligible (to you, anyway) ‰ second delay at the end of each line, enough for the switcher to catch its breath between 128-byte packet transmissions.

Communications Keys

Terminal Command	Mac Keyboard Command
CTRL-C (RUBOUT)	Option-C
BREAK	Option-3
ESCAPE	Option-[
DELETE	Option-Backspace

Communications Keys

Post this table near your modem. Substitute the Mac equivalents for commands required by an on-line service or a remote host computer.

Naming Cells

	A	B	C	D	E
1					
2					
3	This	pmt(int.rate per period, numperiods, pv, fv, type)			
4	is	rate(%)=	9.5		
5	a	rate per period	0.0079166666	(first term)	
6	loan	years =	30		
7	payment	numperiods	360	(second term)	
8	example				
9		loan amount=	$200,000.00	(third term)	
10					
11		payment=	($1,681.71)		
12	scale point for plot-->	600000			
13	annual rates--->	8	9	10	
14	30 yr. interest total:	$328,310.49	$379,328.28	$431,851.53	$485,6
15					

Cell without a Number

Works *doesn't let you name cells per se, but you can label adjacent cells to aid in building formulas or to help someone else enter data in your spreadsheet.*

ReZoom

Resume Works starts up the program and opens all the documents that were open when you quit. You can take advantage of this feature to make a very fast-working system. The next time you use *Works,* make up the empty work files W(WP), S(SS), and D(DB), all formatted to your preference. When you quit, these files are saved, and they reappear in the Window menu when you choose Resume Works.

This means you can always bring a new work file—preset to your specifications—to the screen at any time with exactly one mouse click. It's even faster than *Switcher* because you're working in memory most of the time rather than having to access the disk. If you use one of the empty files, rename it when you close (or quit) so that you won't lose the handy, always-ready blank file.

High Finance

When *Works* first appeared, reviewers complained that spreadsheet cells had to be identified as A3 and J17 instead of Cash-Flow or NetProfit. Although this is strictly true, there's a way to develop your own cell-naming convention so that you can compose formulas on screen without much effort.

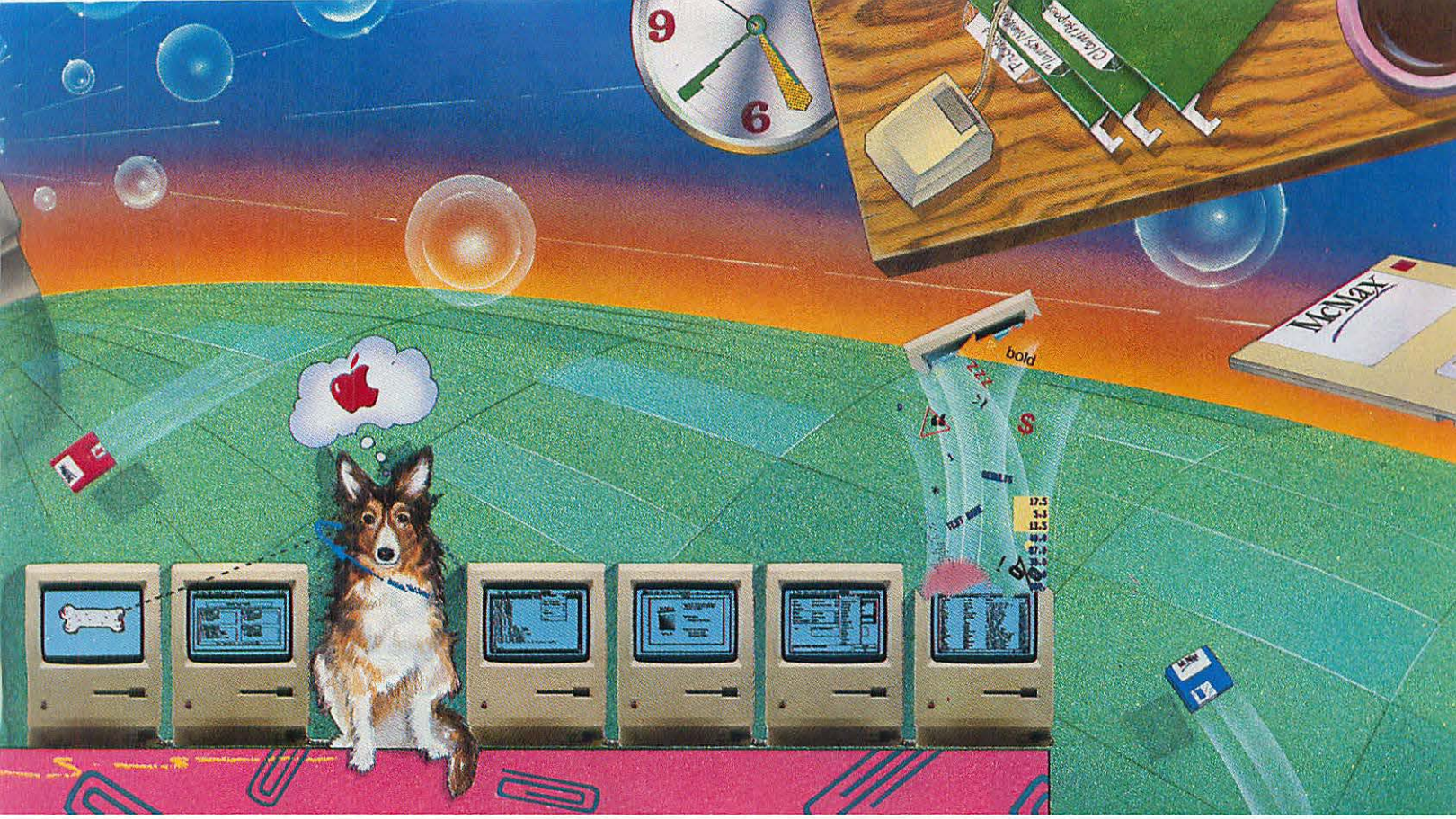
It's easiest to show by example (see "Cell without a Number"). The PMT function requires you to input interest rate, number of periods, balance to be financed (present value), future value (zero for a loan that will be paid off), and type (a flag set to zero for most consumer or mortgage loans). If you plug in 9.5 for the interest rate on a 9.5 percent mortgage, you get an incorrect result—the PMT function wants the interest rate *per month,* which is (9.5/100)/12. So label a cell "Interest rate =" and enter 9.5 in the cell right next to it. Below "Interest rate =" label a cell "Rate for PMT =" and in the cell to the right (under 9.5) perform the divide-by-1200 arithmetic. Do the same for number of periods (usually this is a conversion of number of years to number of months). Then calculate payments by typing "=PMT(" in a blank cell and clicking on the cells for rate, period, and loan amount, followed by the closing parenthesis. To compare various loans, you can copy this block of definitions to different parts of the spreadsheet.

Note that the way the PMT function is set up, if you type 50,000 as the loan amount, the function takes your amount financed as $50 and puts in zero for the FV (full value). Use 50000 (no comma) instead.

A Capitalist Plot

Figures on a spreadsheet translate nearly effortlessly to charts. Because a spreadsheet and its associated Chart window appear on screen at the same time, you can simply call up a new Chart window and move it around on your spreadsheet until you find the rows (for line or bar

(continues)



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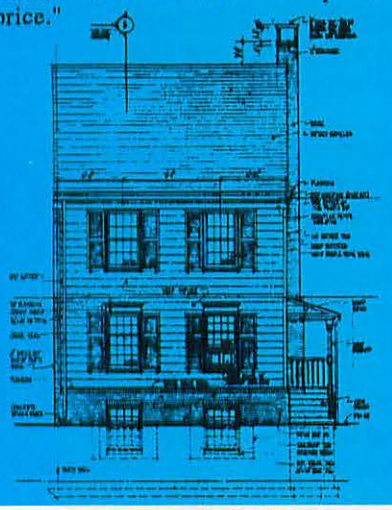
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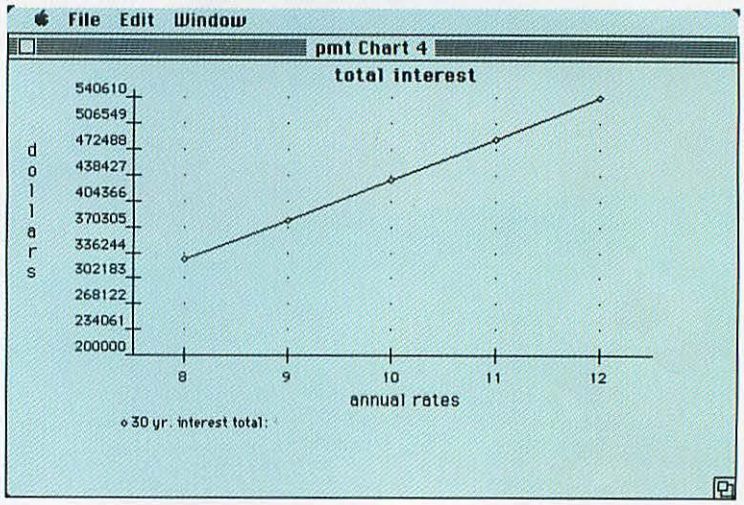
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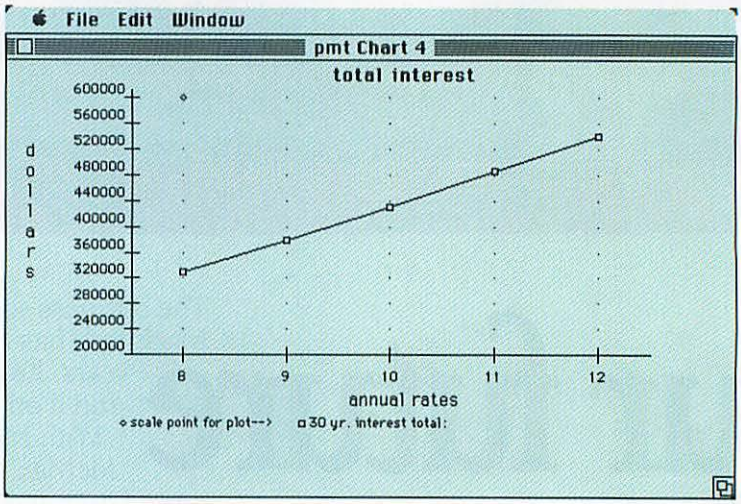
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The Plot Thickens
Two versions of a series plot show the total interest payment on a 30-year, $200,000 mortgage at various interest rates. To achieve round figures in the scale, start the plotting with a cell containing a dummy figure at the high end of the scale, in this case cell B12 on the spreadsheet in "Cell without a Number."



charts) or columns (for pie charts) you want to plot.

The *Works* charting function makes up a vertical scale based on the values in the first row of data it plots. This can result in weird scale intervals (see "The Plot Thickens"). To normalize vertical-scale intervals, pick a dummy first row with a single point that defines the maximum value you are likely to plot (it's the point at 600000 in the figure). This way you force the plot into regular intervals.

As you modify charts associated with a particular spreadsheet, they begin to stack up as Chart 1, Chart 2, and so on, in the Chart Definition window. You will rapidly lose track of your chart definitions unless you resort to Change Chart Name on the Edit menu.

A Quick Click

A double-click anywhere on a Form page in the database immediately transports you to the List view. The return trip requires a double-click specifically in the little boxes on the left of the List page.

Database Subsets

If you have filtered a database with the Match Record option, which lets you look through your database AllMyFriends for Pisces and Cancers who like garlic and who have zip codes lower than 20000, you get a database subset that can be admired but not manipulated. Rename it with the Save As command to turn the record set into a new database you can modify or sort. □

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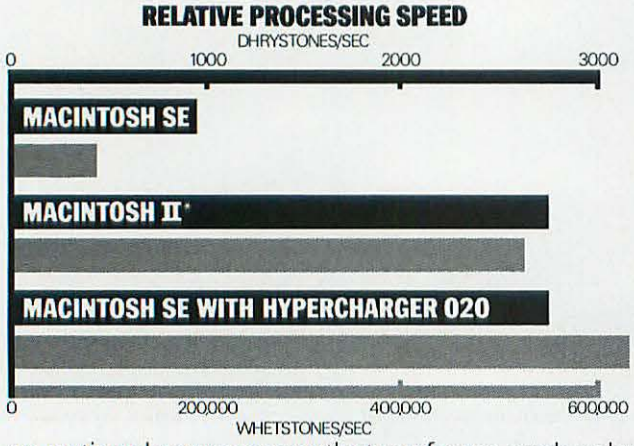
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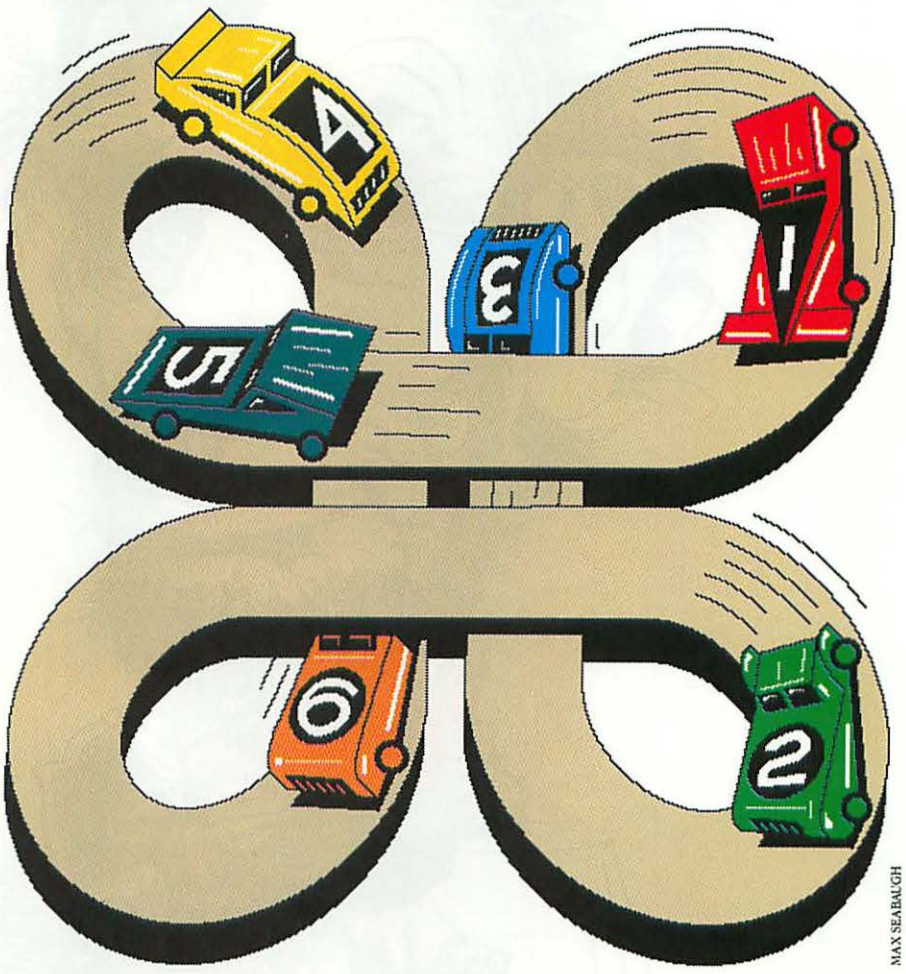
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Mac System Tools

Twenty-six F-keys and how to use them

by Robert C. Eckhardt



MAX SEABAUGH

Until the latest Mac II/SE keyboards were introduced, the Macintosh was the only major personal computer that lacked function keys—those specially labeled keys dedicated to performing a specific task. But even without dedicated function keys on the keyboard, any computer can have what are called *F-keys.* F-keys are programs invoked by pressing ⌘, Shift, and a number key all at once. All Macs come with four preinstalled F-keys: two that eject disks in the internal and external drives (⌘-Shift-1 and -2) and two that send images of the screen to disk files or the printer (⌘-Shift-3 and -4). But there's no reason to stop at four—F-keys designed to perform all kinds of useful tasks abound.

F-keys work much as desk accessories do: you call them up from the desktop or while you are working in an application. Many F-keys provide functions that are otherwise unavailable. Other F-keys are functional equivalents of familiar desk accessories. (And by replacing desk accessories with F-keys, you free up a few slots under the Apple menu, which ordinarily can hold only a limited number of desk accessories.) F-keys are often free, or at most, inexpensive—a whole suite of F-keys and a program to manage them should cost less than a single computer game at mail-order prices.

Although F-keys have many good points, they do have one drawback: you can't keep an F-key window open while you work. Until you close an open F-key, you can't return to your main application. If you are looking for a desktop utility, such as one that shows free memory or disk space, and you have a choice between an F-key and a desk accessory, remember that only the desk accessory can remain in view while you work on other things.

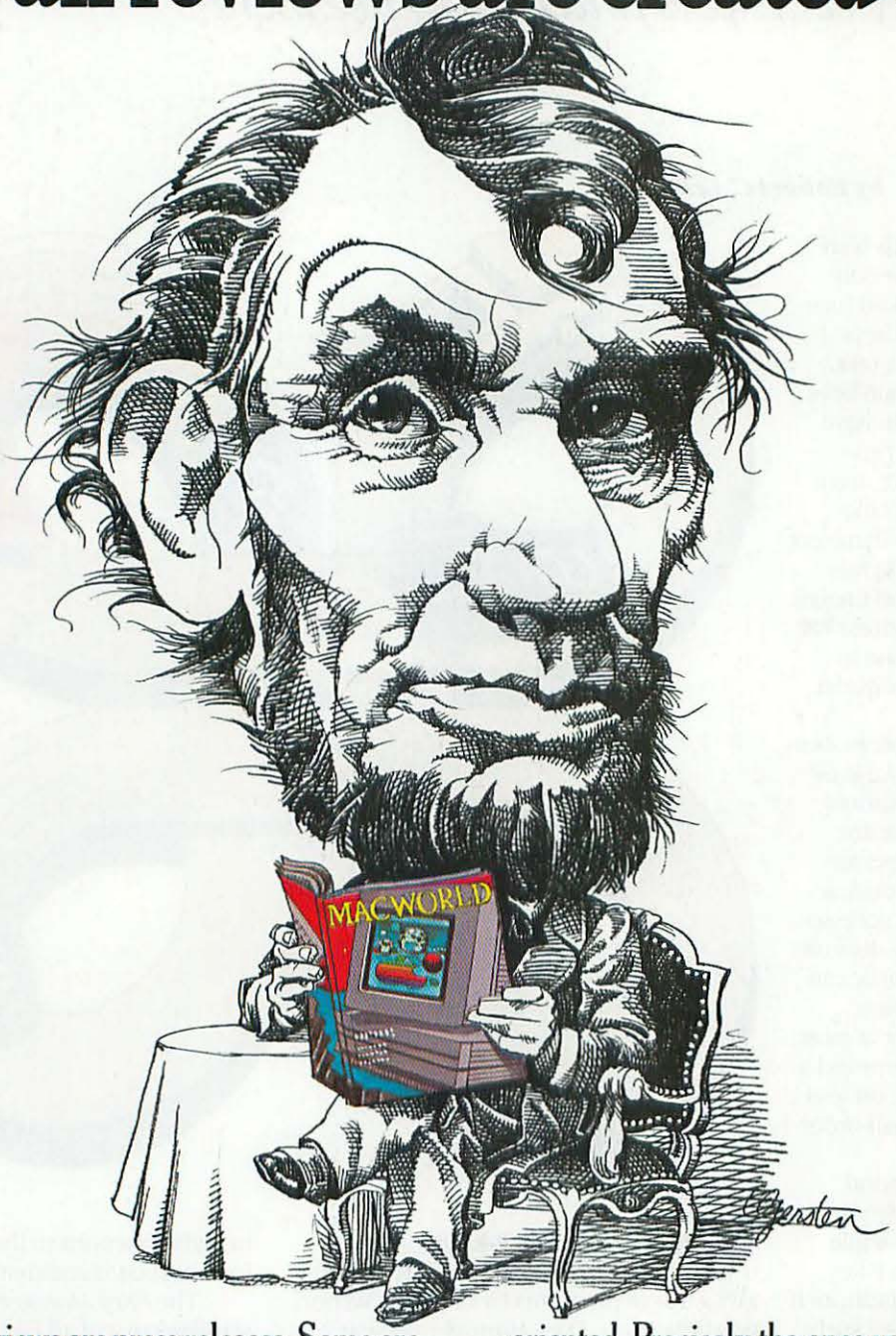
Managing Your F-keys

The preeminent F-key utility is actually a trio of programs by Carlos A. Weber: an application, *FKey Manager* version 2.5, and two Init resources that add capabilities to the System file, Pop-Keys and KeyPad. *FKey Manager* is the most important member of the set and looks and works a lot like the Font/DA Mover, except that it's much more versatile. With *FKey Manager,* you can install, rename, renumber, and remove any number of F-keys and assign up to eight functions to the ⌘-Shift-(number key) keyboard command of your choice.

The *FKey Manager* window shows a scrollable list of all F-keys installed in your System file (see "Installing an F-key"). A resource number precedes the name of each F-key on the list: 0 through 9 for the F-keys that can be called up with a keyboard command, 10 and above for the rest. Renaming,

(continues)

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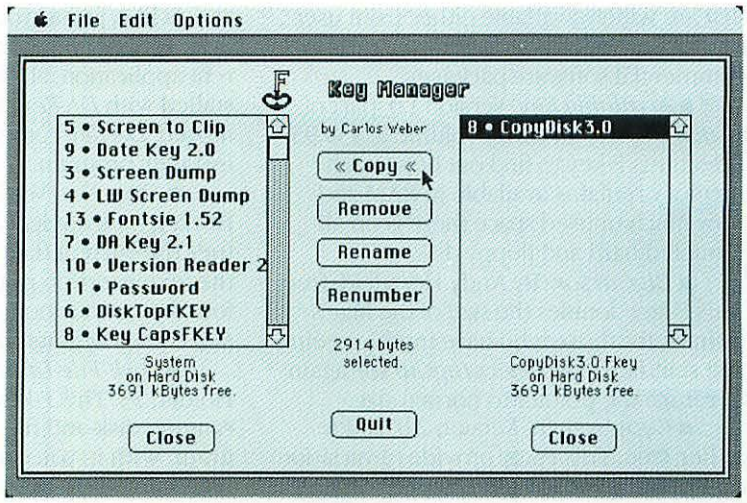
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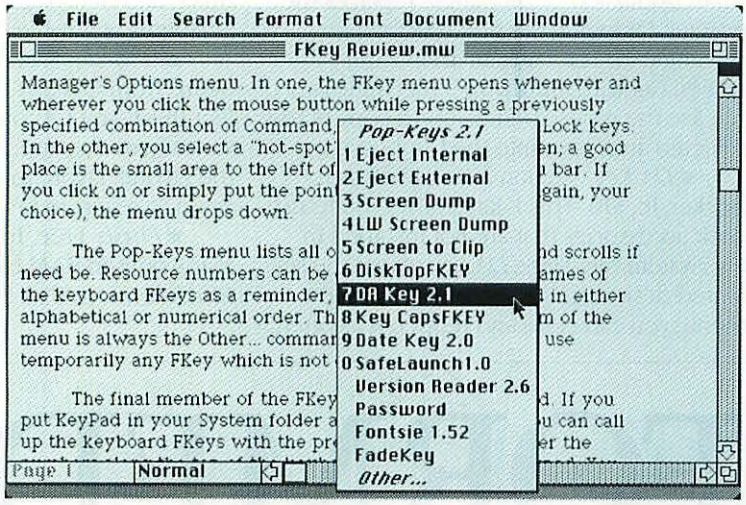
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Installing an F-key
Installing an F-key with FKey Manager *is like installing a font with Font/DA Mover. The numbers next to the F-key name are resource numbers; F-keys with numbers less than 10 can be called up from the keyboard at any time, and F-keys with higher numbers are called up from the FKey menu.*



The Pop-Keys Menu
FKey Manager*'s Pop-Keys menu appears whenever you move the pointer to a hot spot on the screen, or when you click the mouse while pressing certain keys. Because you can call up any number of F-keys with the Pop-Keys menu, you can install many more than the keyboard limit of ten.*

renumbering, and removing F-keys is simply a matter of highlighting one or more F-keys and clicking on the appropriate command button next to the list. Installing F-keys requires two extra steps: opening a source F-key file and assigning it a resource number.

You can install F-keys in F-key files, in System files, or in application files, and *FKey Manager* allows you to work with them no matter where they are. However, if you keep them in the System file, you can back them up with *FKey Manager*'s Archive command and restore them should disaster strike. With *FKey Manager* you can remove the Apple F-keys that take a snapshot of the screen (⌘-Shift-3 and -4) and replace them, either with revised versions such as *LaserKey* or with entirely different F-keys. You cannot, however, remove or replace Apple's disk-eject F-keys (⌘-Shift-1 and -2).

To run F-keys not available from the keyboard, you select them from a special menu created by Pop-Keys (which must be placed in your System Folder). The Pop-Keys menu works in one of two ways, which you determine with the Configure Pop-Keys command in *FKey Manager*'s Options menu. In one, the FKey menu opens whenever and wherever you click the mouse button while pressing a previously specified combination of ⌘, Shift, Option, and Caps Lock keys. In the other, you select a hot spot anywhere on the screen (a good place is the small area to the left of the Apple on the menu bar). If you click on or simply move the pointer over the hot spot, the menu drops down (see "The Pop-Keys Menu").

The Pop-Keys menu lists all of the installed F-keys. The menu can display resource numbers as a reminder and lists F-keys in either alphabetical or numerical order. The last item on the menu is always the Other command, which allows you to access any F-key not currently installed.

The final member of the *FKey Manager* trio is KeyPad. If you have a Mac Plus and put KeyPad in your System Folder, you can call up the keyboard F-keys by pressing a single key: either a number from the top of the keyboard or one on the keypad. You select these options, or turn them off altogether, with *FKey Manager*'s Configure KeyPad command; you can even assign a keyboard command to toggle this feature on and off so you can choose the keypad or the number keys according to the task.

FKey Manager, Pop-Keys, KeyPad, and the comprehensive, illustrated *FKey Manager* manual (a *MacWrite* document) are free and available from many user-group software libraries, electronic bulletin boards, and information utilities such as CompuServe.

Some Fancy F-key Footwork

Two other programs enable you to further fine-tune the way you work with F-keys. One, *KeyString* (by Joseph P. McLain, Jr., $20 shareware fee), makes it possible to call up any installed F-key with a multiple-key keyboard command. *KeyString* is actually a set of programs that allows you to redefine the keyboard in various ways. To assign F-key keyboard commands, you need *KeyString*'s Key Edit desk accessory, the Key Str Boot Init resource, and the Key Str Boot Builder application. Since *KeyString*'s documentation is a little sketchy, here is a quick summary of the steps used to assign keyboard commands to F-keys: First, use *FKey Manager* to find out which F-keys are numbered 10 or above. Place Key Str Boot in the System Folder and restart your Macintosh. Now open the Key Edit desk accessory and choose the Select command from the Key Edit menu. Type the key combination you want to assign to your F-key and then type the number of the F-key in the F-key# text box. Finally, select the Replace Selected Key command from the Key Edit menu to put your changes into effect. Repeat this process for every F-key you want to access with a keyboard command. If you use applications like *Microsoft Word* version 3.0, which uses many ⌘-(key), ⌘-Shift-(key), and ⌘-Option-(key) combinations, take special care not to assign key combinations already spoken for.

Although you can save the new keyboard configuration with Key Edit's Save To File command, a better method is to load

(continues)

the commands automatically with a special file—called a *boot file*—created with the Key Str Boot Builder program. To create the boot file, start the program while your F-key assignments are in memory and click on the Make Boot File button. Then remove the original Key Str Boot file from the System Folder and put the new boot file in its place.

One other notable F-key utility is *FKey Maker* by Loftus E. Becker, Jr. *FKey Maker* creates a file (called Open DA FKeys) full of F-keys, each of which opens one of the desk accessories in your System file. Installing some or all of these F-keys allows you to open the corresponding desk accessories with keyboard F-key commands. If you have *KeyString,* you can even install the entire set of F-keys and then use *KeyString* to assign keyboard commands to those F-keys that lack them.

F-keys in Review

Even if you've never used an F-key, by now you must have some idea of how handy they are. Small wonder, then, that there are so many available—far too many to describe here. What follows is an annotated list of some of the most useful F-keys that are widely available either from user groups and electronic bulletin boards or in commercial software packages.

■ *Available Key* Version 1.0, part of *Quick & Dirty Utilities,* Volume 2, $39.95. Select this F-key to find out how much memory remains available in RAM and how much unused space there is on all mounted hard and floppy disks.

■ *BigCursor* By Andy Hertzfeld, free. This F-key doubles the size of the Mac's pointer, for those who have trouble seeing it at standard size. Select *BigCursor* again to return the pointer to normal size.

■ *Copy Screen* Version 2.0, by Joe Miller, free. This F-key provides a variation on Apple's standard screen-to-disk-file F-key. When you call up *Copy Screen,* a small upper-left-corner angle replaces the pointer. Dragging the pointer creates a rectangle for selecting an area of the screen (as with *MacPaint*'s rectangle tool); release the mouse button, and a copy of the selected area goes into the Clipboard.

■ *DA Key* Version 2.15, by Loftus E. Becker, Jr., $10. This F-key allows you to use desk accessories that are not installed in the System file. Since *DA Key* places the selected desk accessory under the Apple menu, you can close and reopen it as often as you like, just as you would any other desk accessory. When you quit your current application, all desk accessories installed with *DA Key* are automatically removed. *DA Key* comes with its own installer program.

■ *Date Key* Version 2.02, by Loftus E. Becker, Jr., $3. Select *Date Key* to enter either the current date or the current time at the text insertion point. You choose from four formats for both date and time. *Date Key* comes with its own installer program.

■ *Disk-File Utility* Version 1.0, by John Holder, $3. This F-key is a fairly wide-ranging disk-and-file management program. With it, you can rename and delete files, copy 400K disks, determine how much free space is available on floppy disks, and change (or just view) the Finder attributes of any file.

■ *Dvorak* Free. To convert your keyboard from QWERTY to Dvorak, simply select this F-key. Of course, the key labels stay where they are, so you need to know the Dvorak layout to use this one. Select it again to revert to QWERTY.

■ *Flush* Free. In an effort to make the Mac's built-in RAM cache a little safer, *Flush* sends to disk any disk writes cur-

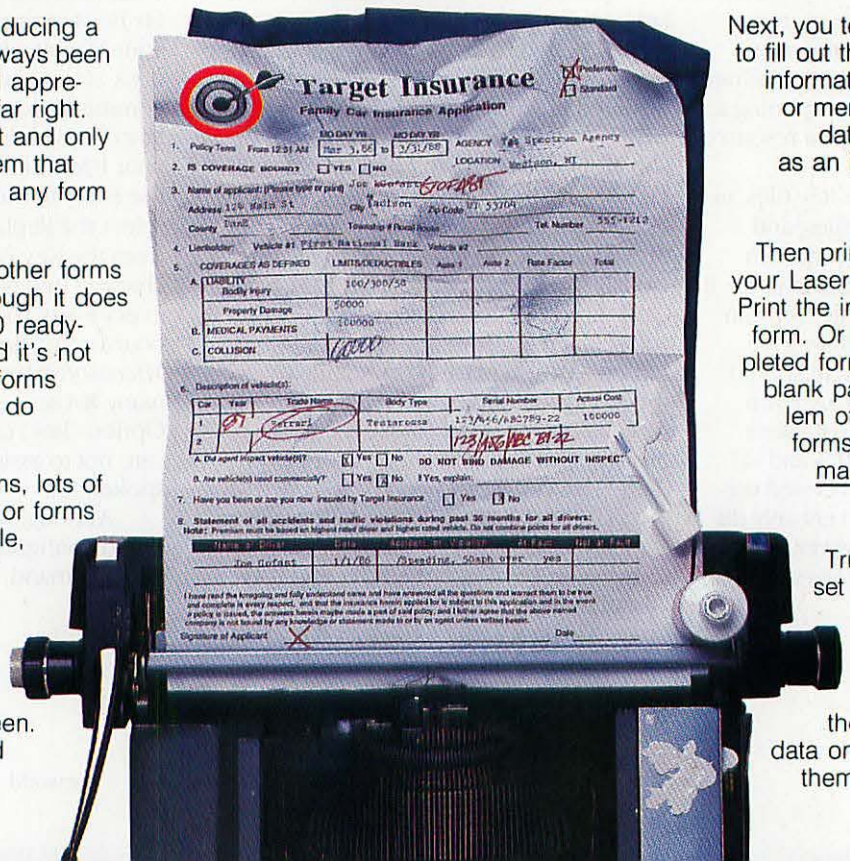
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Forms deformed? If producing a presentable form has always been a formidable task, you'll appreciate the scene on the far right. It's TrueForm™—the first and only Macintosh™-based system that lets you deftly deal with any form you feed it.

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rently held in Apple's RAM cache (and therefore not yet saved).

■ *Fontsie* Version 1.52, by Loftus E. Becker, Jr., $5. *Fontsie* makes it possible to temporarily add fonts not installed in the System file to your application's font menu. *Fontsie* doesn't work with some programs, for example, *MacDraw, Microsoft Word,* and *SuperPaint;* for these programs, there is a less-convenient variation called *Fontsie Special.* Fonts installed with *Fontsie* are available throughout the current work session, but when you quit the application you used *Fontsie* with, all the temporary fonts are removed.

■ *GetInfo* Version 1.0, by Carlos Weber, free; also part of *Quick and Dirty Utilities,* Volume 2, $39.95. If you are running an application and want to read the Finder's Get Info comments, use these F-keys to do so. Weber's F-key only displays the text. You can edit the comments with the *Quick & Dirty* F-key, which also displays information about the file's size, location, and the creation and last modification dates.

■ *Init* Version 5.2, Scott Winders and Alan Pavlish, free. *Init* initializes or erases both 400K and 800K disks from within an application, using either the internal or external drive. It comes with its own installer program.

■ *LaserKey* Version 1.0 by Lew Rollins, $15 shareware. *LaserKey* replaces Apple's standard F-key 4 (which sends the active window or the entire screen to the ImageWriter) with one that works with the ImageWriter, the AppleTalk ImageWriter, and the LaserWriter. In addition to the image, the printout contains the name of the application, the date, and the time. Each time you use it, you can request multiple copies, turn smoothing on or off, and if desired, hide the cursor before printing.

■ *Moving Lines* By John Raymonds, free. This screensaver draws an ever-changing pattern of white lines on a black background. Click on the mouse button or press a key to turn the screen back on.

■ *Password* Version 1.1, by William Steinberg, free. Once *Password* is invoked, your Macintosh doesn't respond until you enter the correct password or reset your computer. To change the default password ("Password," with an uppercase P), which you should do before you install the F-key, you'll need *Fedit Plus* and the courage to alter real, live code. *Password* is also available in Init resource and application format.

■ *Pathname* Free. This F-key provides a quick and accurate way to enter the path for any file. (A path is the route you take, from disk to folder to file, to locate a given document or application.) *Pathname* places the complete and properly punctuated path name of the selected file in the Clipboard. Use the Paste command to move the path name into your document.

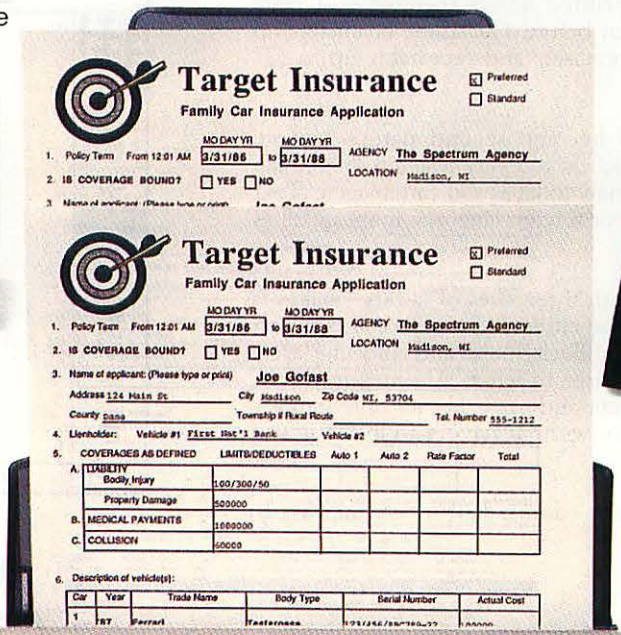
■ *SafeLaunch* Version 1.0, by Fred Reed, $5. *SafeLaunch* transfers you quickly from one application to another without the usually obligatory stop at the Finder. For programs that have a ⌘-Q keyboard Quit command, *SafeLaunch* automatically initiates a safe, orderly quit sequence and then opens the requested application. For programs that do not recognize ⌘-Q, *SafeLaunch* waits for you to quit the program and then initiates the transfer. *SafeLaunch* can also remember a specific application and, until you tell it otherwise, always transfer to that application automatically. As with any transfer program, I recom-

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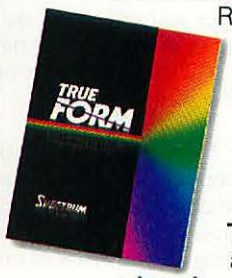




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mend that you test it well before incorporating it into your daily routine.

■ *ScreenToPaint* By Steve Maller, free. This is another variation on Apple's screen snapshot F-key. Like Apple's F-key, it saves an image of the screen to disk. But *ScreenToPaint* does it much more elegantly: it centers the image on the page, defines the edge of the screen with a line, and labels the *MacPaint* files it creates from *A* to *Z*.

■ *Screen Saver* By Mike Cohen, free. When invoked, *Screen Saver* installs a RAM-resident utility that waits for you to stop working. After a minute or two of inactivity, it inverts the screen to white on black, then back to black on white, and so on, every 15 seconds or so, until you start typing or using the mouse again. Select *Screen Saver* a second time to remove the program from memory. Be sure to test *Screen Saver,* especially while printing and telecommunicating; some screen savers have the unpleasant side effect of turning off printing or communications sessions when they blank the screen.

■ *SetFile Key* Part of *Quick & Dirty Utilities,* Volume 2, $39.95. This F-key displays information about the selected file (size, location, and dates created and last modified), and allows you to change the type and creator of the file and reset its Finder attributes. (If you don't know what those last terms mean, you would be well advised not to change them.)

■ *Space Warp* Free. This screensaver puts a stream of fast-moving stars on the otherwise black screen. To return to earth, press a key or click the mouse button. As with *Screen Saver* or any similar progam, be sure to test it out.

■ *Timer Key* Version 1.0, by Loftus E. Becker, Jr., $5. This is an F-key version of Becker's *Time Logger* desk accessory, a cheap and easy way to keep track of how you use your Mac. *Timer Key* stores, in text-only files, information on each file you open: date and time opened, date and time closed, number of minutes used, a file description, and special code entered by you when the file is opened. You can store everything in a single time log or maintain separate logs for each job. *Timer Key* logs can be read by most spreadsheets and databases.

■ *Toggle Key* Free; also part of *Quick & Dirty Utilities,* Volume 2, $39.95 and *FKToggle* 0.1, free. These two F-keys change the right and left angle brackets (< and >) to a comma and a period, so you get commas and periods even when the Shift key is depressed. Some programs, such as *Word* 3.0, do not work with either F-key.

■ *Version Reader* Version 2.6 by John Holder, free. This F-key displays the contents of a selected application's signature resource, which usually contains the program's version number and date.

■ *Set Sound Key* Version 1.0, free. Use this F-key to quickly change the volume level of the internal speaker. Simply call up *Set Sound Key* and press a number key: 0 for silent running, 1 through 7 for ever greater volume levels.

■ *Window* By Charlie Bounds, free. *Window* sends the current window to the back and brings all other windows forward one level. It is a primitive but useful addition to any multiwindow program (including the Finder) that lacks a Window menu. Be sure to close any Alert or Dialog boxes before invoking *Window.* □

See *Where to Buy* for product details.

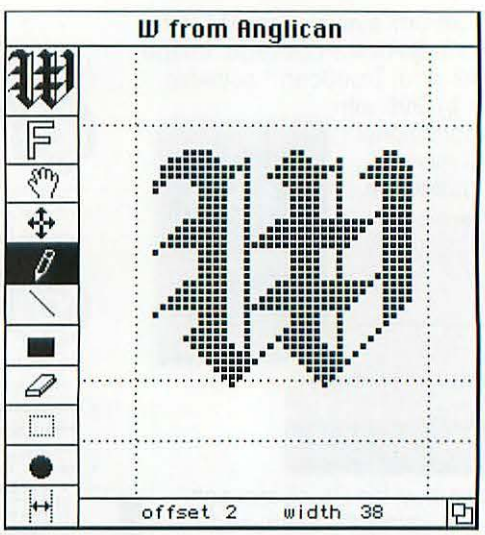
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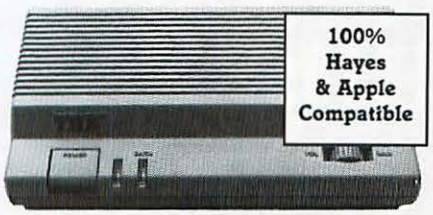
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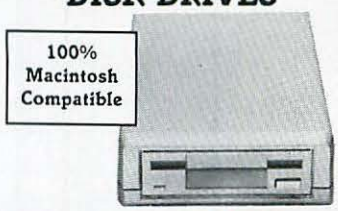
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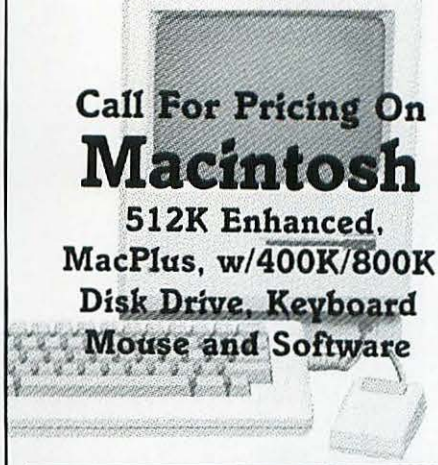
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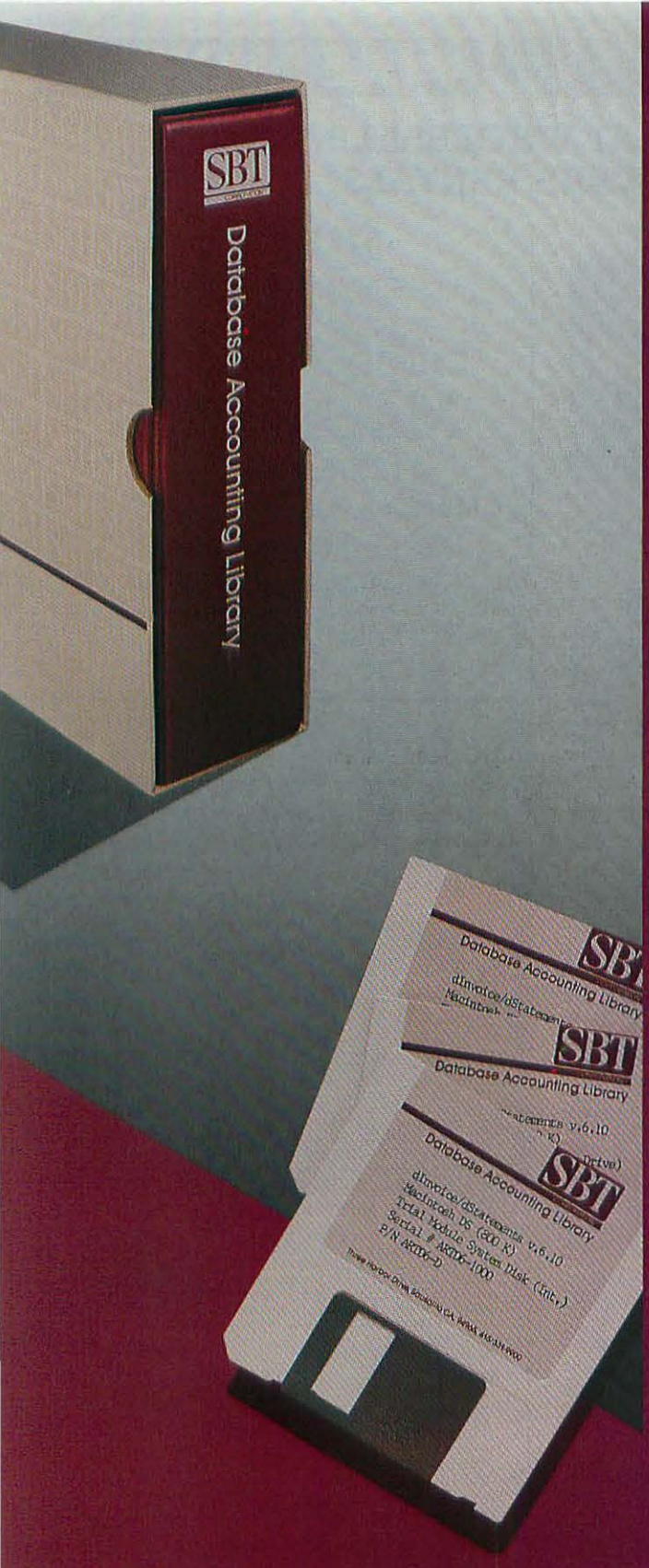
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Pages 57 to 68
Where Are the Heavy Hitters?

Championship Star League Baseball
Version 1.0. Gamestar, P.O. Box 7286, Mountain View, CA 94039, 415/960-0518, 800/227-9759. Key-disk copy protection. 128K minimum memory. $34.95.

Computer Baseball
Version 1.4. Strategic Simulations, Inc., 1046 N. Rengstorff Ave., Mountain View, CA 94043, 415/964-1353. 128K minimum memory. $39.95.

Hardball
Accolade, Inc., 20813 Stevens Creek Blvd., Cupertino, CA 95014, 408/446-5757. Key-disk copy protection. 512K minimum memory. $44.95.

MicroLeague Baseball II
MicroLeague Sports, Inc., 2201 Drummond Plaza, Newark, DE 19711, 302/368-9990, 800/752-9225. Key-disk copy protection. 512K minimum memory. Price to be announced.

Pinball Construction Set
Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404, 415/571-7171, 800/245-4525, 800/562-1112 in CA. Key-disk copy protection. 128K minimum memory. $39.95.

Pages 108 to 115
Chasing Rainbows

19" Color Monitor for the Mac II
SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884. Requires video adapter card. $2995.

19" Monochrome Monitor for the Mac II
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Apple High-Resolution Monochrome Monitor for the Mac II
Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. Requires Macintosh II Video Card. $399.

AppleColor High-Resolution RGB Monitor for the Mac II
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Graphix for the Mac II
SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884. $495.

Jasmine Video Card for the Mac II
Jasmine Computer Systems, 555 De Haro St., San Francisco, CA 94107, 415/621-4339. $499.

LaserView for the Mac II and Mac SE
Sigma Designs, Inc., 46501 Landing Pkwy., Fremont, CA 94538, 415/770-0100. Price to be announced.

Macintosh II Video Card
Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. Macintosh II Video Card $499, Expansion Kit $199.

MegaScreen for the Mac II and Mac SE
MicroGraphic Images Corp., 20954 Osborne St., Canoga Park, CA 91304, 818/407-0571. Price to be announced.

NSC Video Card for the Mac II
National Semiconductor, 2900 Semiconductor Dr., P.O. Box 58090, Santa Clara, CA 95052-8090, 408/721-5000. Price to be announced.

Sony Multiscan CPD-1302 for the Mac II
Sony Corp. of America, Sony Drive, Park Ridge, NJ 07656, 800/222-0878. Requires video adapter card and adapter cable. $945.

Spectrum 1000/1 for the Mac II
SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884. Spectrum $795; upgrade to Spectrum 1000/8 $749.

Spectrum 1000/8 for the Mac II
SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884. $1495.

The Big Picture for the Mac II and Mac SE
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VideoWorks II
Macromind, Inc., 1028 W. Wolfram St., Chicago, IL 60657, 312/871-0987. 512K minimum memory. $149.95.

Pages 116 to 121
Scanning the Horizon

Abaton Scan 300
Abaton Technology Corp., 7901 Stoneridge Dr. #500, Pleasanton, CA 94566, 415/463-8822. 512K minimum memory; requires external drive; Mac Plus with hard disk and Laser-

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Writer recommended. Model 1 $2495, Model 2 (includes Abaton Character Reader for optical character recognition) $3195.

Adobe Illustrator
Version 1.0. Adobe Systems, Inc., 1870 Embarcadero Rd., Palo Alto, CA 94303, 415/852-0271, 800/292-3623. Key-disk copy protection. 1MB minimum memory; scanning device recommended. $495.

AST TurboScan
Version 1.1. AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, 714/553-0340. 512K minimum memory; Mac Plus with hard disk and LaserWriter recommended. $2395.

Cricket Draw
Version 1.01. Cricket Software, Inc., 30 Valley Stream Pkwy., Malvern, PA 19355, 215/251-9890, 800/345-8112, 800/662-2444 in PA. 512KE minimum memory; LaserWriter recommended. $295.

GraphicWorks
Version 1.1. Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062, 312/480-7667, 800/221-9884, 800/942-7315 in IL. 512K minimum memory; requires 800K drive storage. $99.95.

MacPaint
Version 1.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K with external drive recommended. $125.

MacScan
New Image Technology, Inc., 10300 Greenbelt Rd. #104, Seabrook, MD 20706, 301/464-3100. 1MB minimum memory; LaserWriter recommended. $1547.

MS-300A
Microtek Lab, Inc., 16901 Southwestern Ave., Gardena, CA 90247, 213/321-2121, 800/654-4160. 512K minimum memory. $2495 includes VersaScan Plus version 1.0; options include MacOCR $595, Automatic Sheet Feeder $295, PC Adapter Kit $195.

PageMaker
Version 2.0. Aldus Corp., 411 First Ave. S #200, Seattle, WA, 98104, 206/622-5500. 512K minimum memory; requires external drive and PostScript printer. $495.

PC Scan Plus
Dest Corp., 1201 Cadillac Ct., Milpitas, CA 95035, 408/946-7100, 800/538-7582. 1MB minimum memory. $3185; includes software and cable.

Pro3D
Version 1.0. Enabling Technologies, Inc., 600 S. Dearborn #1304, Chicago, IL 60605, 312/427-0408. 512K minimum memory. $349.

SuperPaint
Version 1.0. Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126, 619/695-6956. 512K minimum memory; Mac Plus recommended. $99.

ThunderScan
Version 4.0. Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563, 415/254-6581. 512K minimum memory; requires ImageWriter; 800K drive storage recommended. $249.

XPress
Version 1.0. Quark Inc., 2525 W. Evans #220, Denver, CO 80219, 303/934-2211. 512KE minimum memory; requires external drive or hard disk. $695.

Pages 122 to 125
Into the 4th Dimension

4th Dimension
Acius, 20300 Stevens Creek Blvd. #495, Cupertino, CA 95014, 408/252-4444. Product specifications to be announced. $695.

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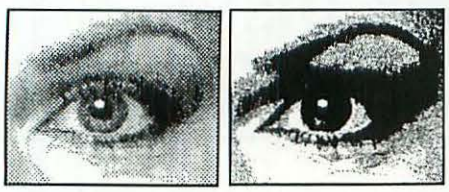
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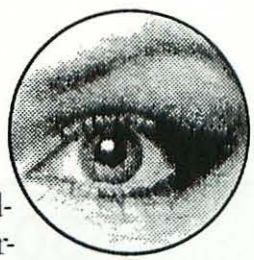
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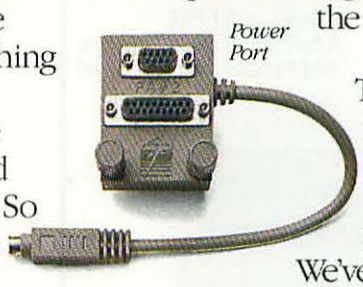
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Pages 126 to 131
Raising the Roof on Storage

AST-4000
AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714, 714/553-0340. 512KE minimum memory; requires SCSI port for the Mac 512KE. 70MB hard disk $3695, 70MB hard disk/60MB tape drive $5295, 140MB hard disk $5999.

Direct Drive 80
Jasmine Computer Systems, 555 De Haro St., San Francisco, CA 94107, 415/621-4339. 512KE minimum memory; requires SCSI port for the Mac 512KE. Prepaid cash $1380, Visa/MasterCard $1422.

MagNet 172x
Mirror Technologies, Inc., 2209 Phelps Rd., Hugo, MN 55038, 612/426-3276. 512KE minimum memory; requires SCSI port for the Mac 512KE; Mac Plus recommended. $6995.

Memorybank 261
Northern Telecom, Inc., 100 Phoenix Dr., Ann Arbor, MI 48106, 313/973-4000, 800/521-3278. 512KE minimum memory; requires SCSI port for the Mac 512KE. $13,500.

PL172
Peripheral Land, 47800 Westinghouse Dr., Fremont, CA 94583, 415/657-2211. 512KE minimum memory; requires SCSI port for the Mac 512KE. $4995.

S-240
CMS Enhancements, Inc., 1372 Valencia Ave., Tustin, CA 92680, 714/259-9555. 1MB minimum memory; includes SCSI utilities. $4195.

Sun Streak SCSI-245
Sunol Systems, Inc., 1177 Quarry Ln., Pleasanton, CA 94566, 415/484-3322. 512KE minimum memory; requires SCSI port for the Mac 512KE. $7495.

Pages 132 to 137
The Architect's Apprentice

Artisto
Version 1.42. Shareware by Tom Taylor, 3707 Poinciana Dr. #137, Santa Clara, CA 95051. 512K minimum memory. Contribution requested.

ComicWorks
Version 1.0. Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062, 800/221-9884, 800/942-7315. 512K minimum memory. $79.95.

EZ-Draft
Version 2.0. Bridgeport Machines, Inc., 500 Lindley St., Bridgeport, CT 06606, 203/367-3651. Key-disk copy protection. 1MB minimum memory; requires external drive; hard disk recommended. $2495.

Frame Mac
Version 1.1. Erez Anzel Software, 113 McCabe Crescent, Thornhill, Ontario, Canada L4J 2S6, 416/738-4601. 512K minimum memory; 800K drive storage recommended. $595.

LaserWriter
Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 512K minimum memory; requires AppleTalk. $4999, LaserWriter Plus $5799.

Linotronic 100, Linotronic 300
Allied Linotype Co., 425 Oser Ave., Hauppauge, NY 11788, 516/434-0095. 128K minimum memory; requires AppleTalk. Linotronic 100 $31,950, Linotronic 300 $59,950.

MacDraft
Version 1.2A. Innovative Data Design, Inc., 2280 Bates Ave., Concord, CA 94520, 415/680-6818. 512K minimum memory; external drive or hard disk recommended. $269.

MacDraw
Version 1.9. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K with external drive recommended. $195.

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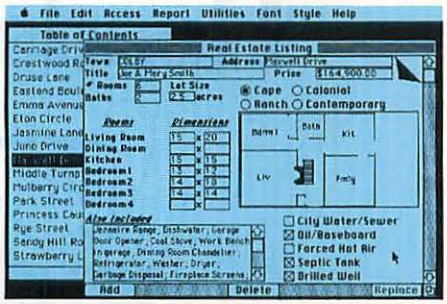
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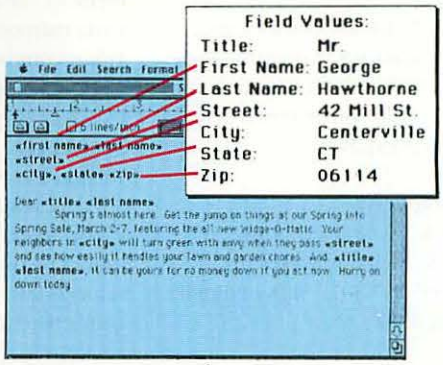
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MacFrame2D
Version 1.2. Design Source Software, 15026 Wellman, Houston, TX 77060, 713/820-7026. 128K minimum memory. $150.

MacPaint
Version 1.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K with external drive recommended. $125.

MacPerspective
Version 3.0. B. Knick Drafting, 313 Marlin Pl., Melbourne Beach, FL 32951, 305/727-8071. 512K minimum memory. $149.

MacPlot
Version 2.4. CompServCo, 800 Freedom Ln., Slidell, LA 70458, 504/649-0484, 800/272-5533 orders only. Key-disk copy protection. 512K minimum memory. Standard version $162, professional version $325.

MacPlot II
Version 2.5 for drafting, version 2.1 for business. Computer Shoppe, P.O. Box 18344, Greensboro, NC 27419, 919/299-4843. Key-disk copy protection. Drafting version 512K minimum memory, business version 128K minimum memory; requires plotter; Mac Plus recommended. Drafting version $295, business version $195.

MacServe
Version 2.2. Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201, 503/226-3620. Copy detection; cannot be used by more than one server. 512K minimum memory; requires hard disk and AppleTalk. $250.

MacSpec
Version 2.0. LM Software, P.O. Box 93, Belmont, CA 94002, 415/345-0388. 512K minimum memory. $199.95.

MGMStation
Version 2.5. Micro CAD/CAM, 3230 Overland Ave. #105, Los Angeles, CA 90034, 818/376-6860. Key-disk copy protection. 512K minimum memory; requires 800K drive. $799.

Micro Planner Plus
Version 5.8. Micro Planning International, 235 Montgomery St. #840, San Francisco, CA 94104, 415/788-3324. 512K minimum memory; requires external drive. $495.

Microsoft Multiplan
Version 1.11. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073, 206/882-8080, 800/426-9400. 128K minimum memory. $195.

MiniCad
Version 2.44. Diehl Graphsoft, 3246-K Normandy Woods Dr., Ellicott City, MD 21043, 301/461-9488. Key-disk copy protection. 512K minimum memory; requires 800K drive space; Mac Plus and hard disk recommended. $495.

NewStudio
Version 1.0. NewLine7 Graphics, P.O. Box 1211, Culver City, CA 90232, 213/277-7217. 512K minimum memory; external drive recommended. $349.

Schema
Version 10/31. Harvard Graduate School of Design, Lab for Computer Graphics, 48 Quincy St., Cambridge, MA 02138, 617/495-2526. 512K minimum memory. $20.

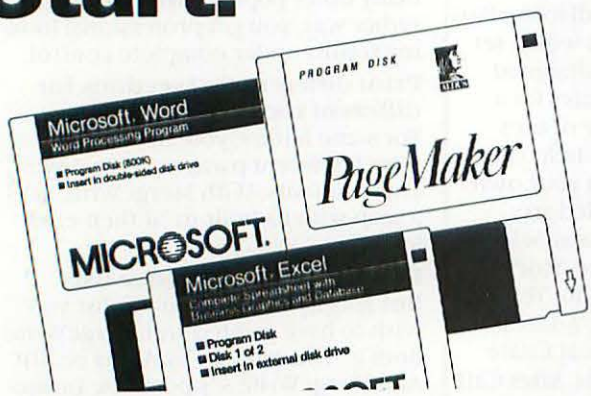
SimpleSpan
Version 2.0. Arch Software, Inc., 1642 Pullan Ave., Cincinnati, OH 45223 or CompServe Co., 800 Freedom Ln., Slidell, LA 70458, 800/272-5533. 512K minimum memory. $99.

Sizer & Adjacency
Version 1.7. Johnson & Johnson Design/Build, 677 Grove St., Newton, MA 02162, 617/253-5965. 128K minimum memory. $69.

SpaceEdit
Version 1.5. Abvent, 9903 Santa Monica Blvd. #268, Beverly Hills, CA 90212, 213/659-5157. Key-disk copy protection. 512K minimum memory; Mac Plus with external drive recommended. $625.

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Version 4.0. Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563, 415/254-6581. 512K minimum memory; requires an ImageWriter; 800K drive storage recommended. $249.

MacProject
Version 1.1. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 90514, 408/996-1010. 128K minimum memory. $125.

Pages 138 to 147
The Modem Marketplace

9600VP
Racal-Vadic, 1525 McCarthy Blvd., Milpitas, CA 95035, 408/946-2227, 800/482-3427. 128K minimum memory. $1495.

AX/9624c
Microcom, Inc., 1400 Providence Hwy., Norwood, MA 02062, 617/762-9310, 800/322-3722. $1799.

Codex 2260
Codex Corp., 20 Cabot Blvd., Mansfield, MA 02048, 617/364-2000, 800/426-1212 ext. 235. $3495.

ComServe
Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201, 503/226-3620. $195 per server.

Fastcomm 2496
Fastcomm Data Corp., 12347-E Sunrise Valley Dr., Reston, VA 22091, 703/620-3900. $999.

inTalk
Version 2.11. Palantir Software, 12777 Jones Rd. #100, Houston, TX 77070, 713/955-8880, 800/368-3797, 800/831-3119 in TX. 512K minimum memory. $145.

MacTerminal
Version 2.1. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; requires Apple or Hayes-compatible modem. $125.

MicroPhone
Version 1.1. Software Ventures Corp., 2907 Claremont Ave. #220, Berkeley, CA 94705, 415/644-3232, 800/336-6477, 800/336-6478 in CA. 128K minimum memory. $74.95.

ModemShare
Mirror Technologies, Inc., 2209 Phelps Rd., Hugo, MN 55038, 612/426-3276. 512K minimum memory; requires AppleTalk and modem. $200.

Pocket Modem
Migent, Inc., P.O. Box 6062, Incline Village, NV 89450, 702/832-3700, 800/633-3444. Requires Mac-to-modem cable. $259.95.

Professional 2400
Novations, Inc., 21345 Lassen St., Chatsworth, CA 91311, 818/998-5060. $750.

Smartcom II
Version 2.2. Hayes Microcomputer Products, Inc., 6610 Bay Circle, Norcross, GA 30071, 404/441-1612. 128K minimum memory. $149.

Smartmodem 2400
Hayes Microcomputer Products, Inc., 6610 Bay Circle, Norcross, GA 30071, 404/441-1612. 128K minimum memory. $899.

Telcor Accelerator 2496
Telcor Systems Corp., 12 Michigan Dr., Natick, MA 01760, 617/653-3995. $995.

Telebit Trailblazer
Telebit Corp., 10440 Bubb Rd., Cupertino, CA 95014, 408/996-8000, 800/835-3248. Requires Mac-to-modem cable; *inTalk* from Palantir Software recommended. $1445.

Page 148
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SmartScrap & The Clipper
Version 1.02 for SmartScrap, version 1.01 for The Clipper. Solutions International, Inc., 29 Main St., Montpelier, VT 05602, 802/229-0368. 512K minimum memory. $59.95.*

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National Instruments, 12109 Technology Blvd., Austin, TX 78727, 512/250-9119, 800/531-4742, 800/433-3488 in TX. 512K minimum memory. $595.

LabVIEW
Version 1.0. National Instruments, 12109 Technology Blvd., Austin, TX 78727, 512/250-9119, 800/531-4742, 800/433-3488 in TX. 1MB minimum memory; Mac Plus with hard disk recommended. $1995.

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GW Instruments, Inc., P.O. Box 2145, 264 Monsignor O'Brien Hwy. #8, Cambridge, MA 02141, 617/625-4096. 512K minimum memory; external drive recommended. $2500.*

MacSpeech Lab
Version 2.0. GW Instruments, Inc., P.O. Box 2145, 264 Monsignor O'Brien Hwy. #8, Cambridge, MA 02141, 617/625-4096. 512K minimum memory; requires MacADIOS; Mac Plus recommended. $300.

Microsoft BASIC Interpreter
Version 3.0. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073, 206/882-8080. 128K minimum memory. $99.

Page 151
Losing the Newsletter Blues

PageMaker
Version 2.0. Aldus Corp., 411 First Ave. S #200, Seattle, WA 98104, 206/622-5500. Key-disk copy protection; installs on hard disks. 512K minimum memory; requires external drive and PostScript printer. $495.

PageMaker Portfolio: Designs for Newsletters
Aldus Corp., 411 First Ave. S #200, Seattle, WA 98104, 206/622-5500. 512K minimum memory; requires external drive and PostScript printer. $79.*

Page 152
In Gangland Chicago

King of Chicago
Version 1.0. Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062, 312/480-7667, 800/221-9884, 800/942-7315 in IL. Key-disk copy protection. 512KE minimum memory; requires 800K drive. $49.95.*

Page 153
The Good and the Ugly

Apple Macintosh Communikit
Version 1.0. Racal-Vadic, 1525 McCarthy Blvd., Milpitas, CA 95035, 408/946-2227, 800/482-3427. 512K minimum memory. $79; kit includes cables, *MacGeorge* version 1.0, and two hours of network service.*

Apple Personal Modem
Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory. $399.

Maxwell 1200VP
Racal-Vadic, 1525 McCarthy Blvd., Milpitas, CA 95035, 408/946-2227, 800/482-3427. 128K minimum memory. $295.*

MicroPhone
Version 1.1. Software Ventures Corp., 2907 Claremont Ave. #220, Berkeley, CA 94705, 415/644-3232, 800/336-6477, 800/336-6478 in CA. 128K minimum memory. $74.95.

ProModem 1200
Prometheus Products, Inc., 4545 Cushing Pkwy., Fremont, CA 94538, 415/490-2370. 128K minimum memory. $349.

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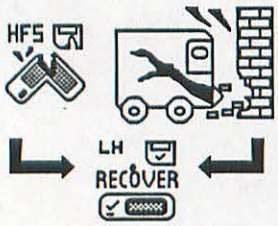
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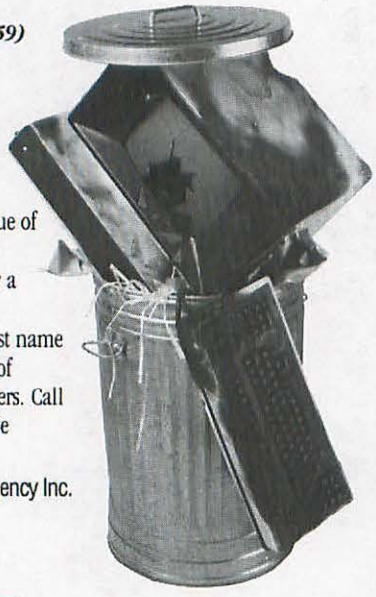
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Sound Choice

ProModem 1200G
Prometheus Products, Inc., 4545 Cushing Pkwy., Fremont, CA 94538, 415/490-2370. 512K minimum memory. $249.

ProModem 2400
Prometheus Products, Inc., 4545 Cushing Pkwy., Fremont, CA 94538, 415/490-2370. 128K minimum memory. $499.

ProModem 2400G
Prometheus Products, Inc., 4545 Cushing Pkwy., Fremont, CA 94538, 415/490-2370. 512K minimum memory. $399.

Red Ryder
Version 9.4. Freesoft Co., 10828 Lacklink St., St. Louis, MO 63114, 314/423-2190. 512K minimum memory. $40.

Smartcom II
Version 2.2. Hayes Microcomputer Products, Inc., 6610 Bay Circle, Norcross, GA 30071, 404/441-1612. 128K minimum memory. $149.

Smartmodem
Hayes Microcomputer Products, Inc., 6610 Bay Circle, Norcross, GA 30071, 404/441-1612. 128K minimum memory. Smartmodem 1200 $599, Smartmodem 2400 $899.

Page 153
Save That Disk!

1st Aid Kit
Version 1.0. 1st Aid Software, 42 Rodnor Rd., Boston, MA 02135, 617/783-7118, 800/843-3497. 128K minimum memory; compatible with MFS only. $99.95.*

Page 155
C Is for Complete

Consulair Mac C/Mac C Toolkit
Version 5.0. Consulair Corp., 140 Campo Dr., Portola Valley, CA 94025, 415/851-3272. 512K minimum memory; external drive recommended. $425.*

Page 156
Sound Choice

Sound Lab
Version 1.1. Blank Software, 1034 Natoma St., San Francisco, CA 94103, 415/863-9224. 512K minimum memory; requires MIDI interface; external drive recommended. $399.95.*

Page 157
Monday Morning Quarterbacking

Mac Pro Football
The Avalon Hill Game Co., 4517 Harford Rd., Baltimore, MD 21214, 301/254-5300, 800/638-9292. Not copyable. 512K minimum memory. $49.95.*

NFL Challenge
Version 1.02, XOR Corp., 5421 Opportunity Ct., Minnetonka, MN 55343, 612/938-0005, 800/635-2425. 512K minimum memory. $99.95.*

Page 158
Tracking Mac Usage

MacInUse
Version 1.0. SoftView, 4820 Adohr Ln., Ste. F, Camarillo, CA 93010, 805/388-2626, 800/622-6829. 128K minimum memory. $49.*

Page 159
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MacMathPac
Version 1.1. Advanced Logistics for Mathematics and Science, 10402 N. Tenth St. #3, Phoenix, AZ 85020, 602/944-5407. 512K minimum memory; external drive recommended. $185; 20 percent educational discount available.*

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3-D CAD

SpaceEdit
Version 1.5. Abvent, 9903 Santa Monica Blvd. #268, Beverly Hills, CA 90212, 213/659-5157. Key-disk copy protection. 512K minimum memory; Mac Plus with external drive recommended. $625.*

Page 161
Dark Waters, Deadly Seas

Sub Battle Simulator
Epyx, Inc., 600 Galveston Dr., Redwood City, CA 94063, 415/366-0606. Not copyable. 512K minimum memory. $39.95.*

Page 162
A Champ Comes Back

Spelling Champion
Version 2.2. Champion Swiftware, 6617 Gettysburg Dr., Madison, WI 53705, 608/833-1777. 128K minimum memory. $39.95.*

Pages 185 to 192
Getting Started with Maintenance

Fanny Mac
Bede Tech, Inc., 8327 Clinton Rd., Cleveland, OH 44144, 216/631-4214, 800/772-4536. $74.

MacBreeze
Levco, 6160 Lusk Blvd. #C-203, San Diego, CA 92121, 619/457-2011. $49.95.

Maccessories Circular Polarizing Filter
Kensington Microware Ltd., 251 Park Ave. S, New York, NY 10010, 212/475-5200, 800/535-4242. $49.95; platinum or beige.

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MacTilt
Ergotron, Inc., 1621 E. 79th St., Minneapolis, MN 55420, 612/854-9116, 800/328-9839. $89.95.

Mouse Cleaner 360°
Ergotron, Inc., 1621 E. 79th St., Minneapolis, MN 55420, 612/854-9116, 800/328-9839. $16.95.

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UNI-1
Curtis Manufacturing Co., Inc., 305 Union St., Peterborough, NH 03458, 603/924-3823, 800/548-4900. $29.95.

Pages 195 to 201
Insights on Microsoft Works

Artisto
Version 1.42. Shareware by Tom Taylor, 3707 Poinciana Dr. #137, Santa Clara, CA 95051. 512K minimum memory. Contribution requested.

Microsoft Word
Version 3.0. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. 512K minimum memory; requires 800K drive storage; Mac Plus with external drive recommended. $395.

Microsoft Works
Version 1.0. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. 512K minimum memory; requires 800K drive storage. $295.

PageMaker
Version 2.0. Aldus Corp., 411 First Ave. S #200, Seattle, WA 98104, 206/622-5500. Key-disk copy protection; installs on hard disks. 512K min imum memory; requires external drive and PostScript printer. $495.

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ReadySetGo
Version 3.0. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653, 201/845-6100, 800/526-9073. 512K minimum memory; external drive recommended. $395.

Silicon Press
Version 1.1. Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126, 619/695-6956. 512K minimum memory. $79.95.

Small Business Works
Version 1.0. Heizer Software, 5120 Coral Ct., Concord, CA 94521, 415/827-9013. 512K minimum memory; requires *Microsoft Works;* Mac Plus with external drive recommended. $50.

SoftStyle Start Printer Driver
Version 2.5. SoftStyle, Inc., 7192 Kalanianaole Hwy. #205, Honolulu, HI 96825, 808/396-6368, 800/367-5600. 512K minimum memory. Toshstart, Bluestart, Epstart, and Jetstart $45, TI-start $75, Laserstart $95, Laserstar Plus $145, Plotstart $125.

The Print-Link
Version 2.2. GDT Softworks, Inc., 2800 Douglas Rd., Ste. D, Burnaby, British Columbia, Canada V5C 5B7, 604/291-9121, 800/663-6222 in U.S. 128K minimum memory. Without cable $62, with cable $84.95.

Tutorial Works
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Utility Works
Version 1.0. Heizer Software, 5120 Coral Ct., Concord, CA 94521, 415/827-9013. 512K minimum memory; requires *Microsoft Works;* Mac Plus with external drive recommended. $50.

WorksPlus Spell
Version 1.0a. Lundeen & Associates, P.O. Box 30038, Oakland, CA 94604, 800/233-6851, 800/922-7587 in CA. 512K minimum memory; Mac Plus recommended. $59.95.

Camera
Version 1.0. Public domain software by Keith A. Esau. 512K minimum memory.

Pages 203 to 208
Mac System Tools

BigCursor
Public domain software by Andy Hertzfeld. 128K minimum memory.

Copy Screen
Version 2.0. Public domain software by Joe Miller. 128K minimum memory.

DA Key
Version 2.15. Shareware by Loftus E. Becker, Jr., 41 Whitney St., Hartford, CT 06105. 512K minimum memory. Registration $10; or send $15, blank disk, and SASE.

Disk-File Utility
Version 1.0. Shareware by John Holder, 7365 El Tomaso Way, Buena Park, CA 90620. 512K minimum memory. $3.

Dvorak
Public domain software. 128K minimum memory.

FKey Maker
Version 2.5. Public domain software by Carlos A. Weber, 250 Douglass St. #12, San Francisco, CA 94114. 512KE minimum memory. Also available by sending blank disk and SASE.

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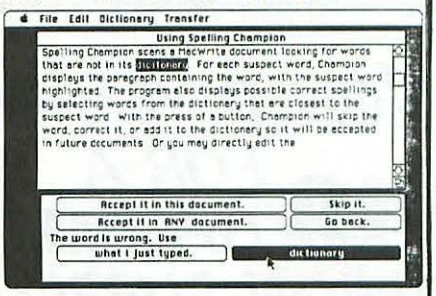
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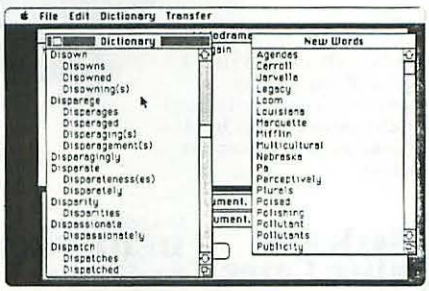
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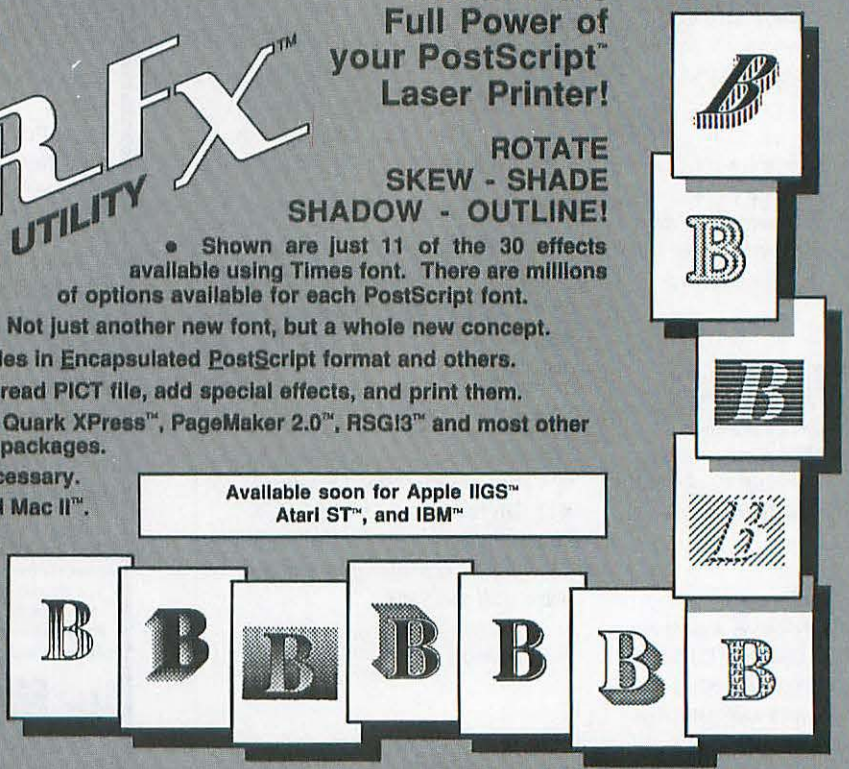
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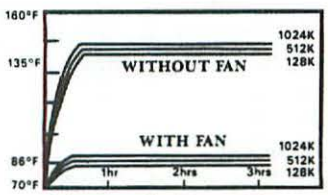
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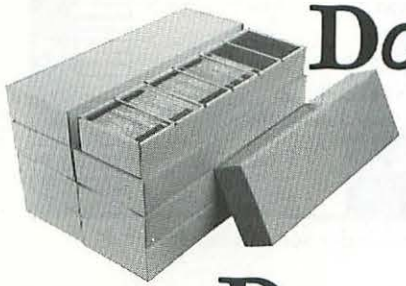
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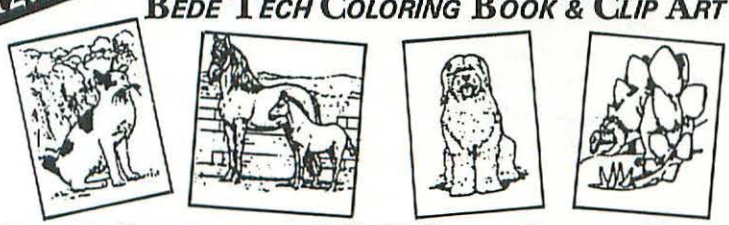
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A complete Macintosh interconnect solution for VAX (VMS and ULTRIX) and UNIX systems. Provides terminal emulation (VT241, VT220, VT100), file-transfer, virtual-disk, and print-server functionality. Supports serial line, remote modem, AppleTalk, Ethernet, or Omninet communications media.
Pacer Software, Inc., 7911 Herschel Ave., #402, La Jolla, CA 92037, 619/454-0565

MAC3000: HP Emulation

MAC3000 provides full terminal emulation of the Hewlett Packard 2624, HP2392, as well as DEC VT-100, IBM3278, & TTY Terminals. MAC3000 also offers the ability to communicate with a variety of computers & electonic information services such as *The Source, Dow Jones News/Retrieval & CompuServe.* Both text & binary file transfer supported. $150.

Int'l Computer Consultants, 1311 Clegg St., Petaluma, CA 94952, 707/765-9200

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Structural Measurement Systems, Inc. (SMS), 651 River Oaks Parkway, San Jose, CA 95134, 408/263-2200. To order call 800/654-5147, 800/247-4994 (CA)

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Micro Dynamics, Ltd., 8555 16th St. #802, Silver Spring, MD 20910, 800/634-7638, 301/589-6300

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Kandu Software Corp., 2305 N. Kentucky St., Arlington, VA 22205, 703/532-0213

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c. In 7-12 months
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Updates

This list brings you highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Bridge version 5.0 improves bidding and will store interesting hands for replay. The player may choose the number of high-card points to be dealt or set the auto-play mode so that the computer controls bidding. Artworx Software Co., 1844 Penfield Rd., Penfield, NY 14526, 800/828-6573. $12 and original disk; $34.95 new.

Cricket Draw version 1.01 fixes problems with grouping and resizing, reflection and tilting, and style changes for text on a path. The new version also prints combined graphics and text documents to an ImageWriter. The program has been enhanced for importing PICT files. Cricket Software, 3508 Market St. #3206, Philadelphia, PA 19104, 215/251-9890. Free; $295 new.

EGBridge version 2.2 and *EGWord* version 2.2 are available from Japanese Language Services, 186 Lincoln St., Boston, MA 02111, 617/338-2211. $10 each; *EGBridge* $249 new, *EGWord* $399 new.

ExperProlog II version 2.3 includes a new assert procedure that lets the program run more efficiently, a new world-free-space function for identifying the amount of memory given to any portion of a program, and an error-hook procedure that closes off the source code by automatically restarting the program each time it encounters an unreadable error. The internal tracking procedures and window labeling have been improved. Automatic memory adjustment enables retention of configuration and memory-requirement changes. Expertelligence, 559 San Ysidro Rd., Santa Barbara, CA 93108, 805/969-7871. $35; $495 new.

Hypernet version 2.0 supports multiuser applications designed for AppleTalk and *AppleShare*, operates transparently over the AppleTalk network, and allows for concurrent file access and password protection. The new version is compatible with all leading Mac hard disks. General Computer Corp., 215 First St., Cambridge, MA 02142, 617/492-5500. Free; $299 per server.

MacChoro version 1.4 enhances printing resolution on the ImageWriter, prints graphics and statistics to the LaserWriter, and allows view sorts and cutting and pasting to the Clipboard. Image Mapping Systems, P.O. Box 31593, Omaha, NE 68132. Free; $295 new.

MacDewey Library Catalog System version 2.5 fully supports the HFS filing system. Book and circulation files created with version 2.0 are compatible with ver-

sion 2.5. Mousetrap Software, 336 Coleman Dr., Monroeville, PA 15146, 412/372-9004. $10 and original disk; $79.95 new.

MacForth Plus version 3.52 adds multitasking, text editing, and run-time application development capabilites. Creative Solutions Inc., 4701 Randolph Rd. #12, Rockville, MD 20852, 301/984-0262. Level 1 $99, Level 2 $49, Level 3 $35; $199 new.

MacPerspective version 3.0 is faster than the previous version and handles very large, complex structures. It now includes an Undo command, the ability to draw circular and elliptical arcs in 3-D, and a hidden-line editor. Drawings may be copied to the Clipboard and transferred to *FullPaint* for rendering in landscape orientation. B. Knick Drafting, 313 Marlin Pl., Melbourne Beach, FL 32951, 305/727-8071. $25; $179 new.

MacSafe version 1.03 has a new decryption safety latch and improved on-line help. The new version corrects a problem with modification dates for *MacSafe* files, and its icon changes to reflect the type of disk a safe is on. Kent Marsh Ltd., Inc., 1200 Post Oak Blvd. #210, Houston, TX 77056, 713/623-8618. Free with return of original disk; $149 new.

MacZap version 4.5 supports all Macintosh disk systems that are block servers or network servers, such as *MacServe*. Micro Analyst Inc., P.O. Box 15003, Austin, TX 78761, 512/926-4527. $18; $63 new.

MathWriter version 1.2 fixes bugs and includes cosmetic changes to superscripts, subscripts, and line widths. The new version offers keyboard equivalents, a grow box, more sophisticated memory management, and new commands. Cooke Publications, P.O. Box 4448, Ithaca, NY 14852, 607/272-2708 ext. 15, 800/482-4438 ext. 15, 800/435-4438 ext. 15 in NY. Free to owners of prerelease version; $10 with original disk to owners of version 1.1; $49.95 new.

Sonar Text Retrieval System version 2.0 searches many files simultaneously and supports *MacWrite* and *WriteNow*. During searches (excluding text documents) and printing, *Sonar* displays the document name, the page number, and the paragraph number. "Next document" and "Previous document" buttons have been added to the display menu. The new version also allows for relational searches. Virginia Systems Software Services, Inc., 5509 W. Bay Ct., Midlothian, VA 23113, 804/739-3200. $30; $249 new.

SmartScrap version 1.02 and *The Clipper* version 1.01 fully support the Mac II. Solutions International, Box 989, 29 Main St., Montpelier, VT 05602, 802/229-9146. $4 shipping and handling; $59.95 new.

Textures version 1.0 is now officially shipping with complete documentation. Addison-Wesley, EMSD, 1 Jacob Way, Reading, MA 01867, 617/944-3700. $495 new. □

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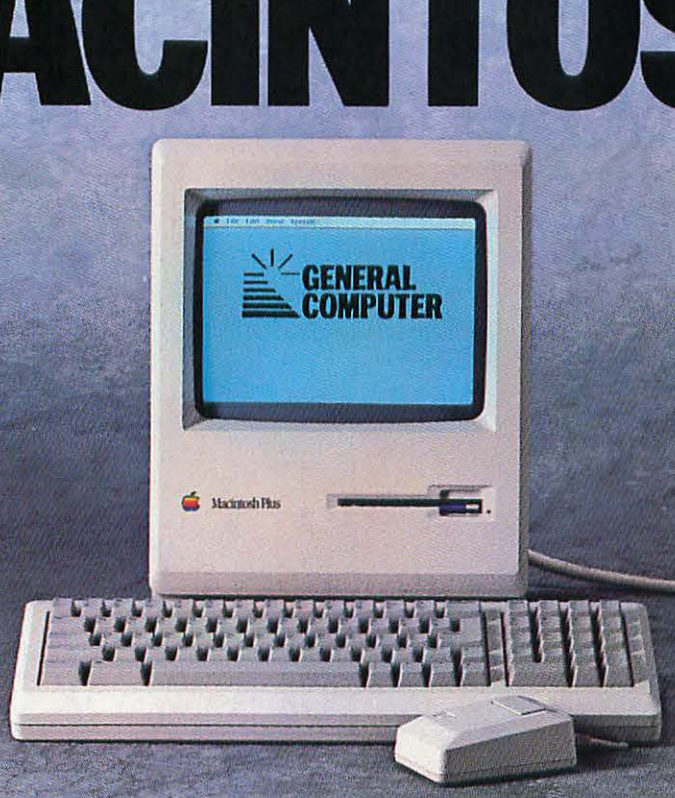
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Now it's expanded the definition of "us"—to include corporate users, professionals and others who need a powerful personal computer at work.

If you recognize yourself in that definition, we'd like to introduce you to a family of peripherals from General Computer.

Because each was created not simply to tap the Macintosh's resources as a tool for business, but dramatically enlarge them in the process.

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HyperDrive was the first hard disk to be installed inside the Macintosh—and it gave the Mac unprecedented increases in speed and capacity.

Now General Computer extends these increases to the Macintosh SE with a new internal hard disk—HyperDrive FI/40.

Given its heritage, it should come as no surprise that HyperDrive FI/40 is extremely fast. Once installed, an FI/40 will speed power-up time by 57%. Load Microsoft's Excel two times faster. And Aldus' PageMaker three times faster.

These and other reductions in work time are matched by a correspondingly vast increase in the capacity for work. An FI/40 will enable the Macintosh to store the data that would otherwise occupy an astonishing 14,000 pages.

But all this isn't to say that HyperDrive's elevated performance is denied those who prefer an external hard disk.

HyperDrive FX/20 and FX/40 provide the same speed and capacity to any Macintosh with an SCSI port. And like all internal HyperDrives—which is to say unlike any other hard disk—the FX drives come with a complete array of software.

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If networks exist to promote the free exchange of information, it follows that the freer the exchange, the better. By that standard, HyperNet 2.0 creates new possibilities for desktop communications.

HyperNet enables up to 32 Macintoshes to read, edit or transfer files from any hard disk in an AppleTalk network. Even if everyone wants to refer to the same information at once.

Unlike other networking software, HyperNet works without need of a dedicated Macintosh to run the network. Or a network administrator to maintain it.

In fact, HyperNet doesn't even require Hyper-

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Macintosh Plus,
HyperDrive FX/20

Macintosh SE,
HyperCharger 020



Drive. It works with any Macintosh and any hard disk made for the Mac. Not to mention all the software compatible with AppleTalk.

Which means you can take full advantage of multi-user programs for electronic mail such as Think Technologies' InBox. Or powerful database managers such as Blyth's Omnis 3.

The resulting network provides a fully compatible complement for people who use AppleShare. And for people who don't, HyperNet provides a fast, easy-to-use network on its own.

INTRODUCING TWO NEW EXPANSIONS OF THE OUTERMOST LIMITS.

If you bought the Macintosh because it delivers "the power to be your best," then more power should make you even better.

That's the mission of the two newest additions to the General Computer family—HyperTape 40 and HyperCharger 020.

HyperTape 40 may not make diskettes obsolete, but it can decrease your dependence on them.

Plugged into any Macintosh with an SCSI port, HyperTape allows you to back up the equivalent of 50 diskettes of data onto one compact 40-megabyte cartridge. HyperTape can be programmed to back up automatically—even when you're away from your Macintosh. And you have the peace of mind that comes with knowing your documents are stored using the most reliable method for protecting data from accidental loss.

Even greater economies of time and effort are available through HyperCharger 020—a powerful enhancement board which, installed inside the Macintosh SE, delivers the processing prowess of the Macintosh II.

A Macintosh SE thus equipped not only runs most software up to an incredible four times faster. HyperCharger's optional floating point co-processor also allows it to handle financial modeling, statistical analysis, and other tasks which ordinarily would require a much larger, more complex and more expensive computer. And since HyperCharger is internally installed, the SE remains as compact and portable as before.

In sum, no other family of peripherals leaves the Macintosh so thoroughly equipped for superior performance. Or so thoroughly qualified for a career in business.

For a detailed review of those qualifications, stop by an authorized General Computer dealer. And for the name of one near you, call (800) 634-9737. In Illinois, (800) 854-9737.*

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Macworld Best-Sellers

Months on chart	Last month	This month	
			Business Software
25	2	1	**Microsoft Word** *Microsoft*
5	1	2	**Microsoft Works** *Microsoft*
17	3	3	**Microsoft Excel** *Microsoft*
13	4	4	**PageMaker** *Aldus*
22	6	5	**MacDraw** *Apple Computer*
9*	7	6	**MacWrite** *Apple Computer*
9*	8	7	**MacPaint** *Apple Computer*
8	5	8	**FullPaint** *Ann Arbor Softworks*
9	–	9	**Omnis 3** *Blyth Software*
4	9	10	**SuperPaint** *Silicon Beach Software*
			Education Software
9	1	1	**Math Blaster** *Davidson and Associates*
9	3	2	**KidsTime** *Great Wave Software*
5	–	3	**MasterType** *Scarborough Systems*
7	–	4	**MacEdge II** *Think Educational Software*
			Entertainment Software
9	1	1	**Flight Simulator** *Microsoft*
5	3	2	**Dark Castle Software** *Silicon Beach Software*
6	5	3	**Gato** *Spectrum Holobyte*
9	2	4	**MacGolf** *Practical Computer Applications*
2	–	5	**Déjà Vu** *Mindscape*
			Networking/Data Communications
9	1	1	**AppleTalk** *Apple Computer*
5	3	2	**TOPS** *Sun Microsystems*
9	2	3	**MacServe** *Infosphere*
1	–	4	**AppleShare** *Apple Computer*
16	4	5	**MacTerminal** *Apple Computer*

Months on chart	Last month	This month	
			Hard Disk Drives
5	1	1	**Apple HD-20SC** *Apple Computer*
9	3	2	**DataFrame 20** *SuperMac Technology*
8	2	3	**Apple Hard Disk 20** *Apple Computer*
6	4	4	**FX-20** *General Computer*
8	5	5	**HyperDrive 20** *General Computer*
			Books
9	1	1	**Excel in Business** *Douglas Cobb, Microsoft Press*
8	3	2	**Inside Macintosh** *Addison-Wesley*
3	5	3	**Creative Progamming in Microsoft BASIC** *Steve Lambert, Microsoft Press*
9	4	4	**The Printed Word** *David A. Kater and Richard L. Kater, Microsoft Press*
2	–	5	**Microsoft BASIC Book/Macintosh Edition** *Walter A. Ettlin and Gregory Solberg, Osborne/McGraw-Hill*

Product Watch

Editors' choice:
Other recent products of particular interest.

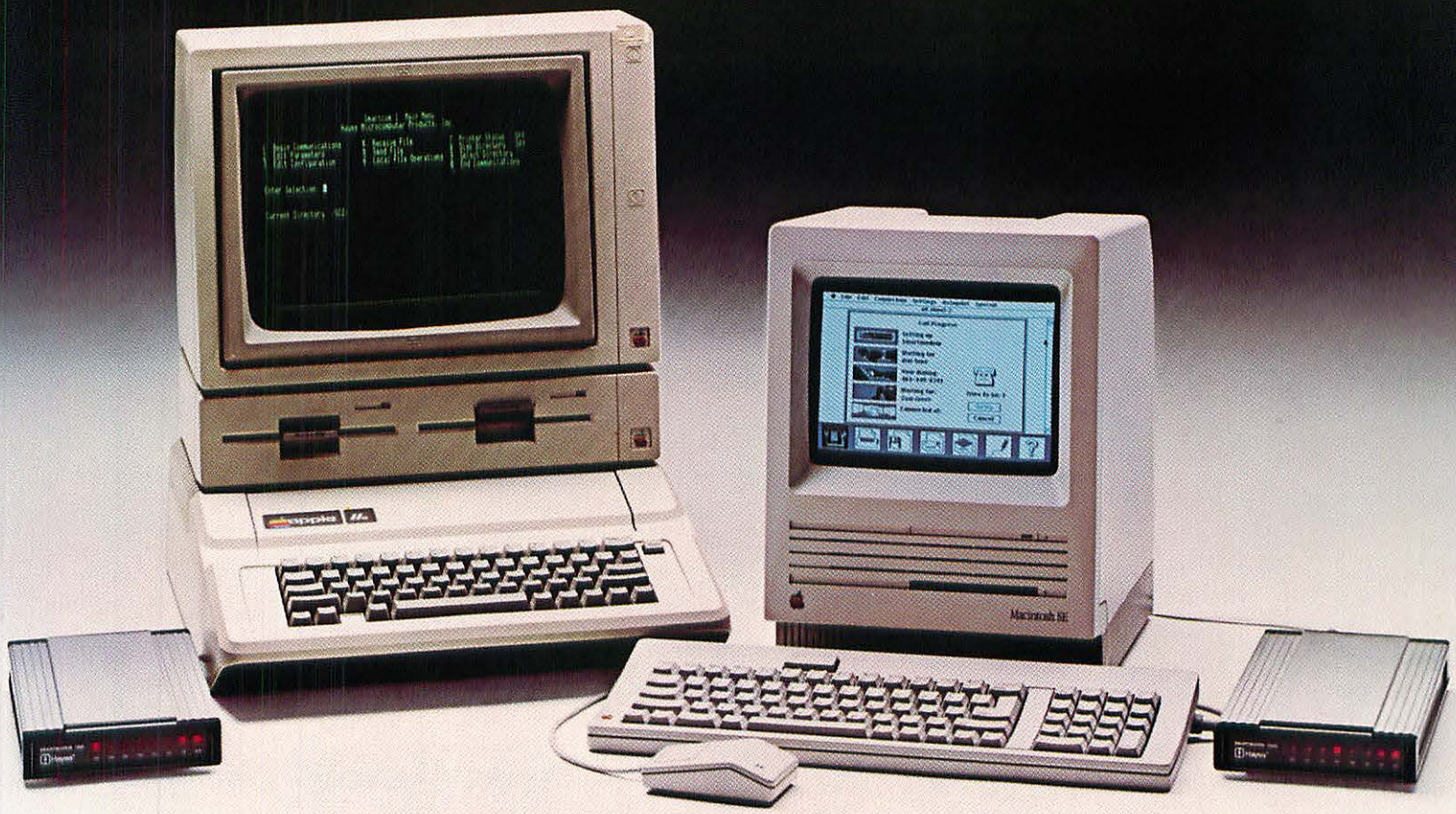
Disktop *CE Software* file-management desk accessory

Shadowgate *Mindscape* game

Spectrum *SuperMac Technology* color monitor and video card

Source: Exclusive InfoCorp survey of more than one hundred Macintosh retailers and selected mail-order suppliers. Covers sales during March 1987.

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Our Smartmodem 2400 and Smartmodem 1200 are also compatible with all versions of the Apple Macintosh,™ including the Macintosh Plus, Macintosh SE and Macintosh II. There's even a specially bundled package for the Macintosh that contains a Smartmodem 1200, modem cables and Smartcom II® software. Smartcom II is our award-winning software specially designed to take advantage of the power and graphics capabilities of the Macintosh.



Last but not least, there's another feature that Hayes 2400 and 1200 bps modems offer that will make them even more compatible with Apple computers, and that's a new low price.

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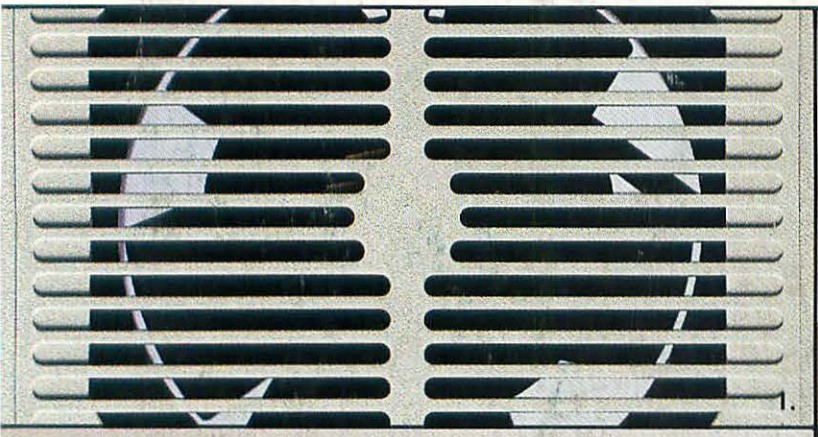
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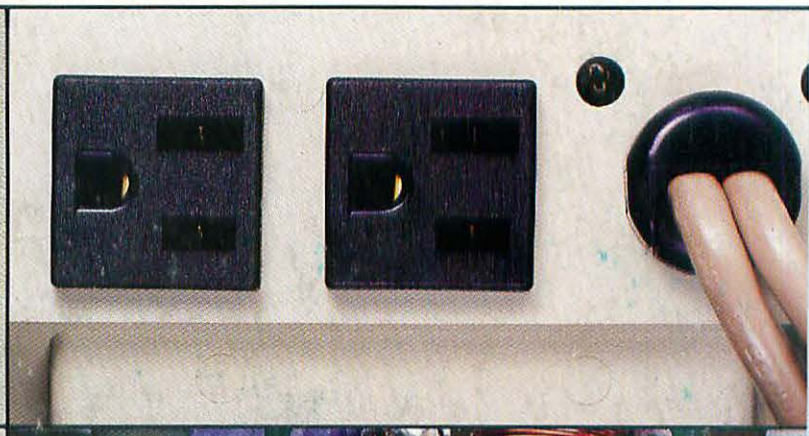
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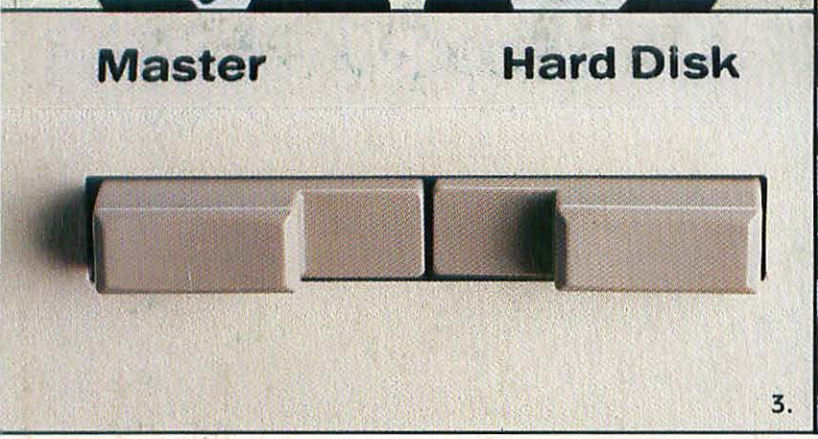
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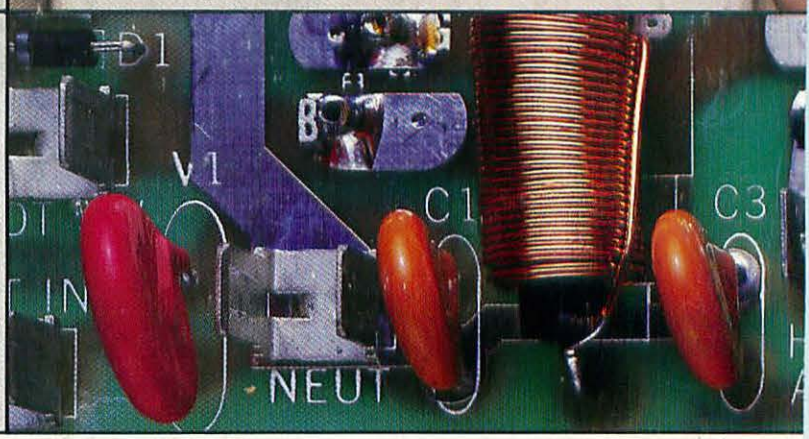


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Compatible with Macintosh and Macintosh Plus, System Saver Mac, $99.95, is available in Apple Beige (model #62300) and Apple Platinum (model #62302). For the dealer nearest you, or to speak to a Kensington sales representative, call toll-free (800)535-4242. In NY (212) 475-5200.

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